GE Healthcare

CARESCAPE Monitor B450

Technical Manual

Software Version 2

Hardware Version B450- 01

All specifications subject to change without notice.

English

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The information in this manual applies to the software and hardware versions listed on the first page of this manual. Due to continuing product innovation, specifications in this manual are subject to change without notice.

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1 About this manual

1.1 Intended use of the manual

This manual contains instructions necessary to install, maintain and service the device to the assembly level. Use it as a guide for installation, maintenance and repairs considered field repairable.

Chapters 1 to 7 provide an overview of the CARESCAPE Monitor B450 patient monitoring system and contains information needed for system installation.

Chapters 8 to 13 provide information for the planned and corrective maintenance of the CARESCAPE Monitor B450 main unit.

Where necessary the manual identifies additional sources of relevant information and technical assistance.

See the Module Frames and Modules Technical Manual for the planned and corrective maintenance information about the parameter modules.

See the supplemental information manual for the technical specifications, default settings and compatibility information, including electromagnetic compatibility.

See the user's manual for the instructions necessary to operate the device safely in accordance with its function and intended use.

1.2 Intended audience of the manual

This manual is intended for service representatives and technical personnel who install, maintain, troubleshoot, or repair this device.

1.3 Conventions used in this manual

Within this manual, special styles and formats are used to distinguish between terms viewed on screen, a button you must press, or a list of menu commands you must select:

- For technical documentation purposes, the abbreviation GE is used for the legal entity names, GE Medical Systems *Information Technologies* Inc. and GE Healthcare Finland Oy.
- Names of hardware keys on the equipment, keypad, remote control, and modules are written in **bold** typeface: **Start Cancel**.
- Menu items are written in ***bold italic*** typeface: ***Monitor Setup***.
- Emphasized text is in *italic* typeface.
- Menu options or control settings selected consecutively are separated by the > symbol: ***Procedures > Cardiac Output***.
- The word "select" means choosing and confirming.
- Messages (alarm messages, informative messages) displayed on the screen are written in ***bold italic*** typeface: ***Learning***.
- Note statements provide application tips or other useful information.

1.3.1 Product naming conventions

In this manual, the CARESCAPE Monitor B450 is referred to as the patient monitor.

The following naming conventions are used to refer to different modules and module categories:

- PDM: Patient Data Module
- PSM: Patient Side Module: E-PSM, E-PSMP, E-PSMW and E-PSMPW.
- E-modules: all modules with prefix E-.
- Cardiac output and SvO_2 E-modules: E-COP and E-COPSv.
- Pressure and Temperature E-modules: E-P, E-PP and E-PT.
- Continuous Cardiac Output Module: E-PiCCO
- CARESCAPE respiratory modules: E-sCO, E-sCOV, E-sCAiO and E-sCAiOV.
- Single-width airway module: E-miniC
- Specialty E-modules: E-NMT, E-EEG, E-BIS and E-ENTROPY
- SpO_2 E-modules: E-NSATX, E-MASIMO

The CARESCAPE Network MC is referred as MC network and the CARESCAPE Network IX as IX network.

Menu naming varies within software packages:

- ***Admit/ Discharge*** is also used in this manual for ***Start/End*** *case* menu (in OR and PACU software).

1.4 Illustrations and names

This manual uses illustrations as examples only. Illustrations in this manual may not necessarily reflect all system settings, features, configurations, or displayed data.

Names of persons, institutions, and places and related information are fictitious; any similarity to actual persons, entities, or places is purely coincidental.

1.5 Ordering manuals

A paper copy of this manual will be provided upon request. Contact your local GE representative and request the part number on the first page of the manual.

1.6 Related documents

- the patient monitor's user's manual
- the patient monitor's supplemental information manual
- Module Frames and Modules Technical Manual
- CARESCAPE Modular Monitors Software Installation Instructions
- CARESCAPE Network Configuration Guide
- CARESCAPE Wireless Network Configuration Guide
- CARESCAPE Modular Monitors Mounting Solutions
- Unity Network Interface Device (ID) Operator's Manual
- iCentral and iCentral Client Technical Reference Manual
- S/5 Network Installation Guide
- iCollect user's manual
- User documentation for displays

NOTE: The referred documents above are subject to change without notice. Please contact your local sales or service representative for possible updates.

1.7 Trademarks

Listed below are GE Medical Systems Information Technologies, Inc. and GE Healthcare Finland Oy trademarks. All other product and company names contained herein are the property of their respective owners.

GE, GE Monogram, and CARESCAPE are trademarks of General Electric Company.

iPanel is a trademark of General Electric Company or one of its subsidiaries.

MUSE, TRAM, Tram-Rac, Trim Knob, and UNITY NETWORK are trademarks of GE Medical Systems, *Information Technologies*, Inc.

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1.7.1 Third party trademarks

NELLCOR is a trademark of Covidien AG.
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Masimo SET is a trademark of Masimo Corporation.
PiCCO is a trademark of Pulsion Medical Systems.
WMM, WPA and WPA2 are trademarks of Wi-Fi Alliance.

1.8 Responsibility of the manufacturer

GE is responsible for the effects on safety, reliability, and performance of the equipment only if:

- Assembly operations, extensions, readjustments, modifications, servicing, or repairs are carried out by authorized service personnel.
- The electrical installation of the relevant room complies with the requirements of the appropriate regulations.
- The equipment is used in accordance with the instructions for use.
- The equipment is installed, maintained and serviced in accordance with the instructions provided in the related technical manuals.

1.9 Product availability

Some of the products mentioned in this manual may not be available in all countries. Please consult your local representative for the availability.

For your notes:

2 Safety information

2.1 General safety statements

See the user's manual for a list of general safety statements.

This device is intended for use under the direct supervision of a licensed health care practitioner.

Contact GE for information before connecting any devices to the equipment that are not recommended in this manual.

Parts and accessories used must meet the requirements of the applicable IEC 60601 series safety standards, and/or the system configuration must meet the requirements of the IEC 60601-1-1 medical electrical systems standard. Refer to the the patient monitor's supplemental information manual for compatible parts and accessories.

Periodically, and whenever the integrity of the product is in doubt, test all functions.

The use of *accessory* equipment not complying with the equivalent safety requirements of this equipment may lead to a reduced level of safety of the resulting system. Consideration relating to the choice shall include:

- use of the accessory in the *patient vicinity*; and
- evidence that the safety certification of the *accessory* has been performed in accordance to the appropriate IEC 60601-1 and/or IEC 60601-1-1 harmonized national standard.

2.2 Safety message signal words

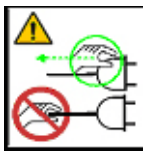
Safety message signal words designate the severity of a potential hazard.

Danger	Indicates a hazardous situation that, if not avoided, will result in death or serious injury.
Warning	Indicates a hazardous situation that, if not avoided, could result in death or serious injury.
Caution	Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.
Notice	Indicates a hazardous situation not related to personal injury that, if not avoided, could result in property damage.

2.3 Safety symbols

NOTE: The following safety-related symbols appear on one or more of the devices.

	General warning. This symbol is identified by a yellow background, black triangular band, and a black symbol.
	General caution sign. IEC 60601-1, 2005 edition This symbol is identified by a white background, black triangular band, and a black symbol.
	ATTENTION: Consult accompanying documents. IEC 60601-1, 1988 edition. This symbol is identified by a white background, black triangular band, and a black exclamation mark.
	Follow instructions for use. This symbol is identified by a blue background and a white symbol.
	Consult operating instructions. / Operating instructions.
	DANGER - Shock hazard. Dangerous voltage. To reduce the risk of electric shock, do not remove cover. Refer servicing to qualified service personnel. This symbol is identified by a yellow background, black triangular band, and a black symbol.
	Electrostatic sensitive device. Connections should not be made to this device unless ESD precautionary procedures are followed.
	Non-ionizing electromagnetic radiation. Interference may occur in the vicinity of this device.
	Type BF (IEC 60601-1) protection against electric shock. Isolated (floating) applied part suitable for intentional external and internal application to the patient, excluding direct cardiac application.
	Type BF (IEC 60601-1) defibrillator-proof protection against electric shock. Isolated (floating) applied part suitable for intentional external and internal application to the patient excluding direct cardiac application.

	Type CF (IEC 60601-1) protection against electric shock. Isolated (floating) applied part suitable for intentional external and internal application to the patient, including direct cardiac application.
	Type CF (IEC 60601-1) defibrillator-proof protection against electric shock. Isolated (floating) applied part suitable for intentional external and internal application to the patient including direct cardiac application.
	Safety ground. Remove power cord from the mains source by grasping the plug. Do not pull on the cable.

For your notes:

3 System overview

3.1 System introduction

The CARESCAPE Monitor B450 is a multi-parameter patient monitor for multiple care areas and intra-hospital transport within a professional healthcare facility.

3.2 System components

3.2.1 Monitor

The patient monitor can be mains voltage or battery powered. It has an integrated AC/DC power supply unit and it supports up-to two detachable lithium-ion batteries. The DC/DC board provides the supply voltages for the electronics of the device, takes care of the power path logic and battery management.

The CPU subsystem takes care of the user input and acquisition data processing and displays the processed information on the screen. It controls the monitor operation, and communication with the other subsystems and external interfaces. The main software and all platform and clinical settings are stored in a detachable flash memory, uDOM.

The patient monitor supports two optional multi-parameter hemodynamic modules: Patient Data Module (PDM) and Patient Side Module (PSM). In addition, it supports one single-width, E-series parameter module that extends the monitoring capability to other hemodynamic modules, gas measurement, brain monitoring and relaxation measurement. The optional integrated recorder enables local printing to a thermal paper.

The patient monitor has a 12" LCD display with integrated LED backlights and a resistive touchscreen sensor. It supports one independently configurable secondary display.

The patient monitor is compatible with wired and wireless CARESCAPE Network MC and S/5 network infrastructures. The wired CARESCAPE Network IX provides access for example to MUSE reports, iPanel applications and IX printers.

The touch user interface is the main method for user input. The patient monitor supports also various USB input devices, including a mouse, an alphanumeric keyboard, a barcode reader and a remote controller.

The monitor frame has an integrated handle and GCX mounting. The alarm system includes a speaker for audible alarms and a separate alarm light for visual alarms.

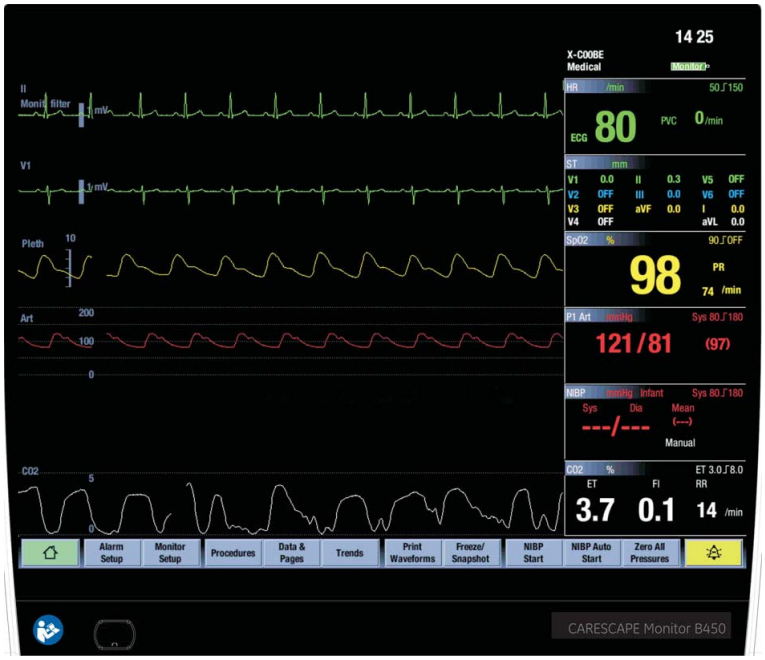
The thermal recorder and WLAN options are also available as a field upgrade.

3.2.2 Software

The patient monitor is highly configurable and provides many monitoring possibilities with a flexible software licensing model.

The monitor supports care area specific software packages for OR, PACU, ICU, ED and NICU. Each dedicated software package provides a comprehensive feature set for the different monitoring needs and can be further extended with the optional feature licenses.

Software license model supports trial licensing and easy field upgrades with license key activation.



3.2.3 Input devices

You can connect several USB input devices to the patient monitor, including alphanumeric keyboard, mouse, remote control and barcode reader.

Refer to the patient monitor's supplemental information manual for a list of compatible USB input devices.

Keyboard

A washable, antibacterial keyboard is specified for use with the monitor. It may be connected to the monitor or display via one of the USB connectors. The keyboard allows you to enter data without using the touchscreen display.

Mouse

A standard mouse may be connected to the monitor or display via one of the USB connectors. The mouse allows you to select any on-screen items without a Trim Knob control or a touchscreen display.

Remote control

The remote control provides all patient monitor controls on a portable component with a Trim Knob control. The remote control is connected to the patient monitor via one of the USB connectors.

Barcode reader

The barcode reader can be used to scan a Technician ID and Patient Information from barcodes when admitting patients.

3.2.4 Acquisition modules

The patient monitor includes standard docking for the following multiparameter hemodynamic modules: PSM and PDM.

PSM

PDM

The integrated E-module slot can occupy one single-width E-module at a time.

Refer to the patient monitor's supplemental information manual for a list of compatible acquisition devices and to the patient monitor's user's manual for a list of parameters each module measures.

3.2.5 CARESCAPE Network MC or S/5 Network

The patient monitor is compatible both with the CARESCAPE Network MC and the S/5 Network infrastructures. The optional WLAN support enables wireless network communication using IEEE 802.11a/b/g.

Refer to the patient monitor's supplemental information manual for a list of compatible CARESCAPE and S/5 Network devices.

The MC Network establishes communication and allows patient data to be sent to an optional CIC Pro Clinical Information Center (central station).

The S/5 Network establishes communication and allows patient data to be sent to an iCentral (central station).

3.2.6 CARESCAPE Network IX

The patient monitor may be connected to the CARESCAPE Network IX.

The IX Network provides you access for example to the MUSE server for MUSE/12SL reports, to Citrix server for iPanel connections and to the IX printers. It also enables centralized Webmin access for service personnel from within the hospital and the InSite with ExC remote service connectivity to GE's support center.

Refer to the CARESCAPE Network Configuration Guide for details on configuring the CARESCAPE Network.

The iPanel application, viewable from one of the monitor's display screens, gives access to desktops created by the hospital IT. These desktops provide patient information from other systems that may be installed at the hospital [e.g., Centricity Clinical Information View (Centricity CIV), MUSE Web, and Picture Archiving Communications System (PACS)]. Desktops

can be created with customer defined resolutions using the hospital-wide login and identification process. The iPanel application is used through a Citrix thin client on the monitor so no additional equipment is required at the bedside.

3.2.7 Unity Network ID connectivity device

The Unity Network ID connectivity device acquires digital data from up to eight peripheral bedside devices (not necessarily manufactured by GE), processes this data and transmits the formatted data to the patient monitor.

The supported interfaces include anesthesia machines, ventilators, gas analyzers, continuous cardiac output devices, pulse oximeters, transcutaneous monitors and point-of-care blood gas monitors.

Refer to the Unity Network Interface Device (ID) Operator's Manual and the patient monitor's supplemental information manual for a list of compatible peripheral devices and to the patient monitor's user's manual for the peripheral device parameter data displayed on the patient monitor.

3.2.8 Secondary display

The patient monitor supports one independent secondary display.

The secondary display is 19" touchscreen LCD with an abbreviated keypad and a Trim Knob control. The secondary display shows visual alarms and provides connectivity to the USB input devices.

Refer to the patient monitor's supplemental information manual for a list of compatible displays.

3.2.9 Printers and recorders

The patient monitor can print to a recorder and to a laser printer.

Refer to the patient monitor's supplemental information manual for a list of compatible recorders and laser printers.

Laser printers

A laser printer can print for example waveforms, graphic and numeric trends, snapshots, events history, parameter specific printouts, stored laboratory data and calculation results and care reports. Refer to the patient monitor's user's manual for more information about printing.

The patient monitor supports printing:

- to a laser printer that is connected to the patient monitor via the IX Network or directly to the IX connector in the patient monitor.
- to a laser printer that is connected to a CIC Pro Clinical Information Center on the MC Network.
- to a laser printer that is connected to an iCentral on the S/5 Network.

Recorders

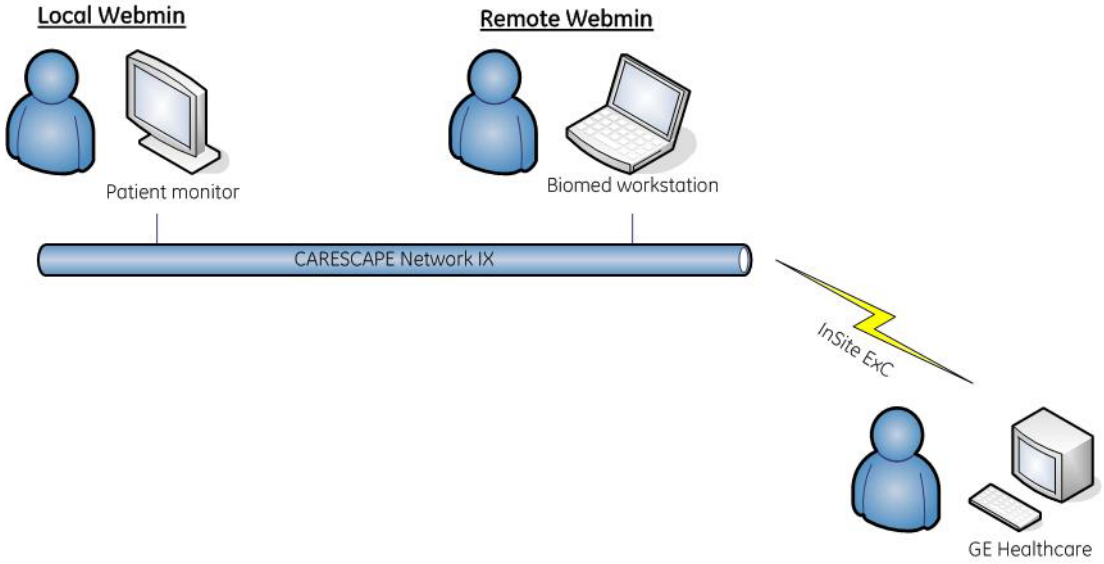
A recorder may print text, waveforms and numeric trends.

The patient monitor supports printing:

- to an integrated, local recorder (optional).
- to a PRN 50M recorder connected to another patient monitor, or to a CIC Pro Clinical Information Center, on the MC Network.

3.2.10 Service Interface

Webmin is a browser-based interface that provides service and diagnostic functions for the patient monitor. Using a web browser, the user can connect to Webmin to configure, diagnose and retrieve system information. The user can access Webmin either locally on the patient monitor or remotely over the IX Network.



Local access to Webmin

The user can access Webmin locally using the integrated browser on the patient monitor.

The other way to access Webmin locally is from a configured service PC that is connected to the patient monitor with an Ethernet crossover cable.

Remote access to Webmin

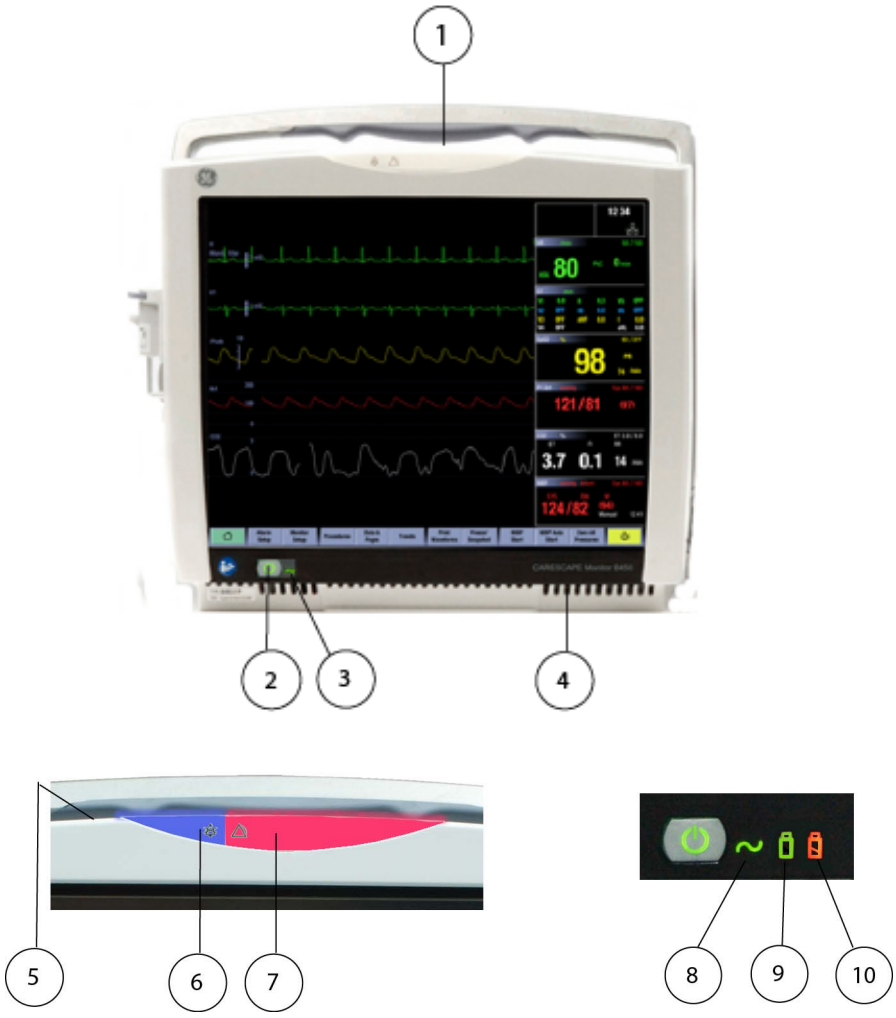
The user also can access Webmin remotely using a configured service PC over the IX Network.

InSite with ExC

InSite with ExC provides a set of software applications to manage, diagnose and track systems at customer sites by using the Internet for secure communications between the customers' and GE's firewalls. InSite with ExC consists of Enterprise Server, which resides at GE's support center, and Remote Service Agent that resides on a system at the customer site (or on a PC controlling the system(s) at the customer site).

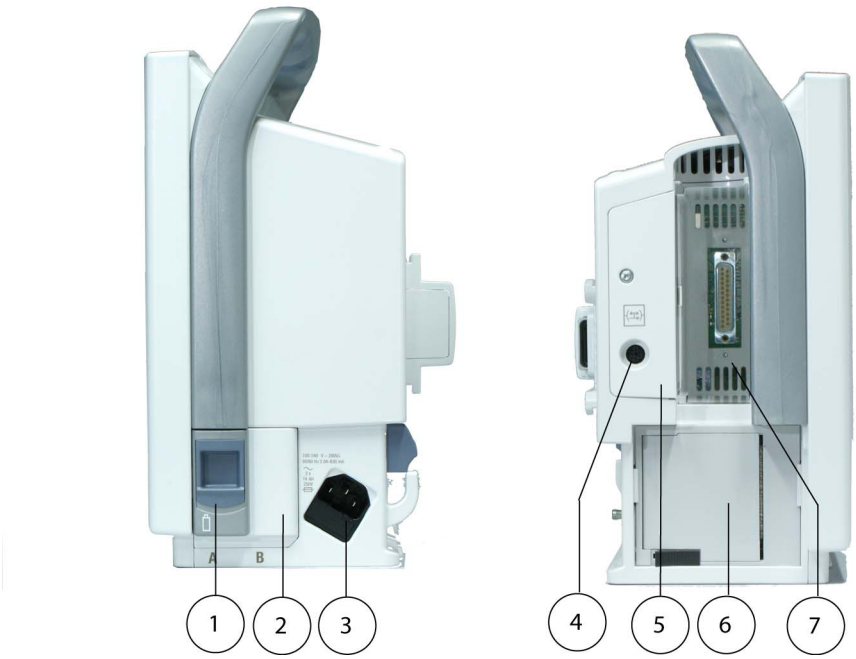
3.3 Controls and connectors

3.3.1 Front view



(1) Alarm light
(2) Power on/standby button
(3) Power indicators
(4) Ventilation holes
(5) Ambient light detector lens
(6) Audio alarm paused/off area (blue)
(7) Alarm light area (blue, yellow, or red)
(8) Mains voltage indicator - the green LED is lit when the patient monitor is connected to AC mains.
(9) Battery use indicator - the green LED is lit when the patient monitor is operating on battery power.
(10) Battery charging/failure indicator - the orange LED is lit when the patient monitor battery is charging and flashing in case of battery failure or missing battery.

3.3.2 Side views

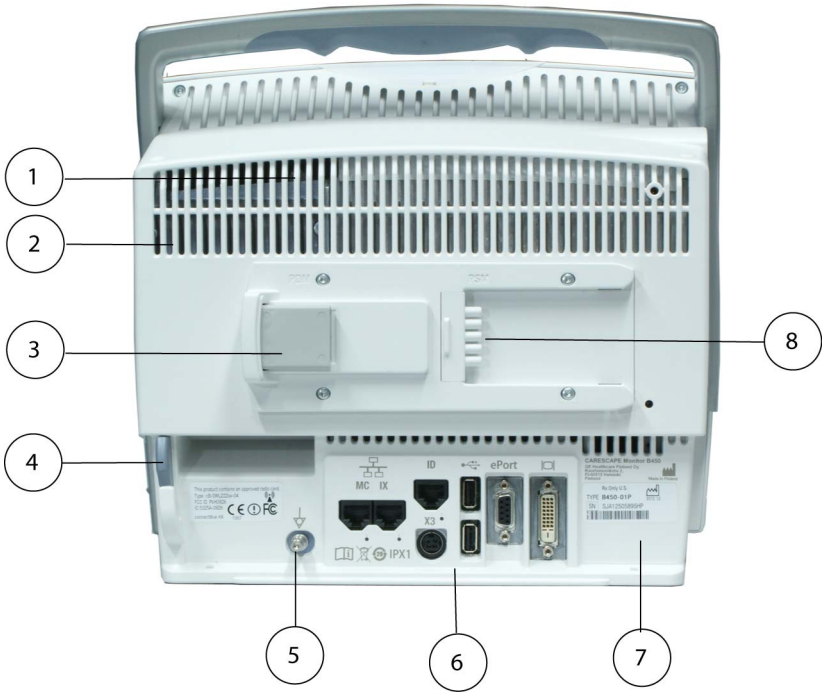


(1) Battery cover release latch
(2) Battery cover
(3) Receptacle for power cord and fuse holder
(4) Defibrillation synchronization connector
(5) Service cover
(6) Recorder*
(7) Module slot

*) optional

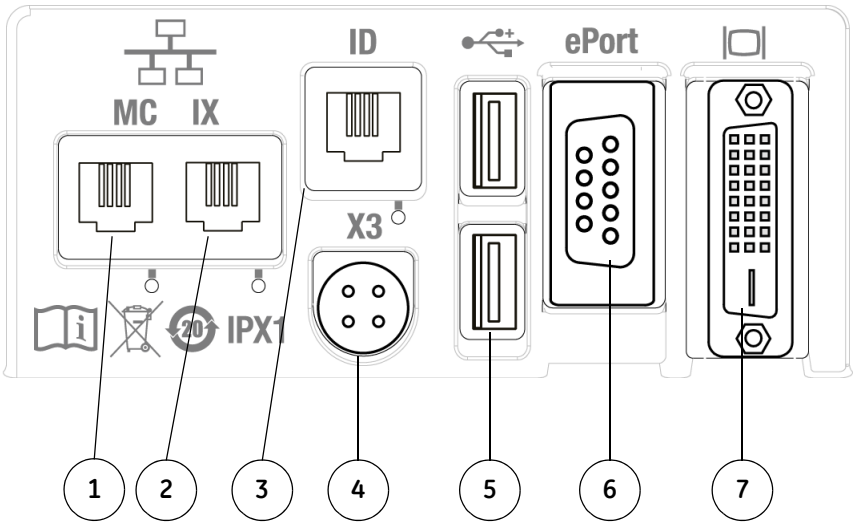
NOTE: The Defibrillation synchronization connector can be used only with E-PSM(P) modules. PDM module has its own defibrillation synchronization connector.

3.3.3 Rear views



(1) Power LEDs for troubleshooting
(2) Ventilation holes
(3) Slide mount with connector for PDM
(4) Cable clamp for power cord
(5) Equipotential connector
(6) Connectors for input/ output devices and networking
(7) Device label
(8) Slide mount with connector for PSM

Interface board connectors



(1) Network connector for the MC Network & S/5 Network
(2) Network connector for the IX Network
(3) Network connector for the Unity Network Interface Device (ID) connectivity device
(4) Remote-on connector
(5) USB ports (2 pcs USB 2.0 Type A connectors)
(6) ePort connector for PDM module
(7) DVI-D connector for a secondary display

3.4 Service information

3.4.1 Service requirements

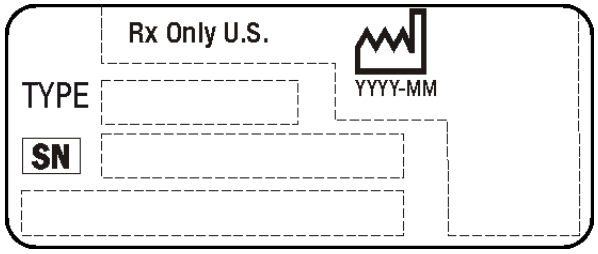
Follow the service requirements listed below.

- Refer equipment servicing to GE authorized service personnel only.
- Any unauthorized attempt to repair equipment under warranty voids that warranty.
- It is the user's responsibility to report the need for service to GE or to one of their authorized agents.
- Failure on the part of the responsible individual, hospital, or institution using this equipment to implement a satisfactory maintenance schedule may cause undue equipment failure and possible health hazards.
- Regular maintenance, irrespective of usage, is essential to ensure that the equipment will always be functional when required.

CAUTION DISPOSAL - At the end of its service life, the product described in this manual, as well as its accessories, must be disposed of in compliance with the guidelines regulating the disposal of each product. If you have any questions concerning disposal of a product, please contact GE or its representatives.

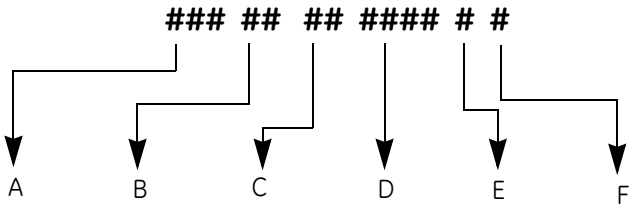
3.4.2 Equipment identification

Every GE device has a unique serial number for identification. The serial number is written in a device label. A sample of the information on a device label is shown below.



The product code for CARESCAPE Monitor B450 is SJA.

The device plate is located on the rear of the patient monitor. The device type and the serial number are also in the ID label in the front panel.



	Description
A	product code
B	year manufactured
C	fiscal week manufactured
D	production sequence number
E	manufacturing site
F	miscellaneous characteristic

3.5 Product security

The patient monitoring software incorporates an assortment of security features designed to allow a flexible approach to safe and secure implementation, focusing on the principles of confidentiality, integrity, and availability. These features assist you in using the system in a manner that protects patient privacy and security in your setting, and also addresses expectations for the environment where the system will be used.

3.5.1 Security features

Access control

Access control is the overall mechanism used to determine and enforce the following:

- Who has access
- How individuals gain access
- When access is permitted
- What information may be accessed

Other than clinical and Webmin applications, access to other subsystems (for example BIOS) is restricted. The clinical and Webmin application interfaces have a role-based access control (for example, biomed and clinical). A user may log into these interfaces (for example, Webmin) to perform operations that are limited to the generic user. See the user and technical manuals for detailed information on available features.

Authentication

Authentication is the process of proving individual identity, and is a key element in an access control system. In the clinical and Webmin applications, there are certain features that require user authentication. To access these features, the user must log into the clinical and Webmin applications with a valid username and password.

Authorization

Authorization is the process of granting and revoking access to information, and is another key element in an access control system. Although primarily an administrative process that is driven by an organization's policies and procedures, the patient monitor contains features that will help implement and enforce an organization's method.

Both clinical and Webmin applications have an authorization mechanism to provide information to the user.

Audit

The ability to record and examine system activity is crucial to a successful information security program, as well as a regulatory requirement in most environments. The patient monitor stores system and Webmin access logs.

Malicious software protection

Vigilant defense on many levels is required to keep systems free from compromise by malicious software. Effective protection requires cooperation and partnership between GE and our customers.

Based on the Linux Operating System, the patient monitor has a built-in firewall to allow external communication to occur on a limited number of ports on the IX Network.

The following product features contribute to defense against malicious software:

- System integrity checking

  The patient monitor performs integrity checking on the root file system to detect any changes to the file system contents. Any modification to the root file system contents will generate an error to the patient monitoring software application. The patient monitoring software will then display a technical alarm to the user.

- Device design and configuration (hardening)

  The patient monitor has been hardened through the restriction and removal of user access to core operating system functionality. In addition, unneeded functionality has been removed or restricted.

- Antivirus software

  To provide seamless real-time patient monitoring, the patient monitor does not have antivirus software.

- Security updates and patching processes

  Security updates and patches cannot be applied to the CARESCAPE product without going through GE's vigorous software verification and validation process. Any software update needs will be communicated by GE.

3.5.2 Security operations

Network security

GE requires that the MC port of the patient monitor be connected to a physically or virtually dedicated CARESCAPE Network MC or S/5 Network, isolated from all other networks.

GE requires that the IX port of the patient monitor be connected to a physically or virtually dedicated CARESCAPE Network IX with controlled connection to the organization's general purpose computing network. Traffic between the organization's network and IX port of the patient monitor must be limited to the following packet flows listed below.

Inbound

Source device	Destination device	Protocol	Destination port	Use
Any	Patient monitor	icmp	N/A	ping
Customer defined		tcp	10000	Webmin
Customer defined		tcp	10001	Software transfer
DHCP server		tcp	67, 68	DHCP

Packets that are part of the communication initiated by authorized devices in the organization's network are allowed to go out of the IX Network (reflexive).

Outbound

Source device	Destination Device	Protocol	Destination port	Use
Patient monitor	Any	icmp	N/A	ping
	us1-ws.service.gehealthcare.com	tcp	443	InSite with ExC (Web Services)
	us1-rd.service.gehealthcare.com	tcp	443	InSite with ExC (Remote Tunnel)
	Citrix Server	tcp	1494	Citrix
	Printer	tcp	631	Printing
	MUSE	tcp	80	MUSE

Packets that are part of the communication initiated by the patient monitor are allowed into the IX Network (reflexive).

Wireless Network Security

The patient monitor can operate both in the wired and the wireless MC Network or S/5 Network. IX Network is wired only.

Refer to the Wireless LAN Network Installation Guide and S/5 Network Installation Guide for more information regarding the security features of the wireless MC Network and the S/5 Wireless Network, respectively.

Network Identification

The Service Set Identifier (SSID), also known as network name, identifies a particular wireless network. The patient monitors shall be configured to use the same SSID with the access points to enable wireless communication. It is recommended to configure access points not to broadcast SSID to the wireless network.

The wireless MC Network shall be logically separated to its own virtual LAN with a dedicated SSID. The S/5 Wireless Network shall have dedicated access points that are physically isolated from all other networks.

Security (Authentication and Confidentiality)

The data transmitted on the wireless network can be secured by one of the following methods:

- WEP (64-bit) (NOTE: S/5 only)
- WEP (128-bit)
- WPA-PSK (TKIP) (NOTE: MC only)
- WPA2-PSK (AES-CCMP) (NOTE: MC Only)

3.5.3 Product change management

GE has rigorous software verification and validation processes. Any software update needs will be communicated by GE. The patient monitoring system, including all aspects of software, should be used as it was intended by GE.

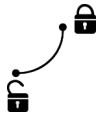
3.5.4 Communication

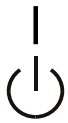
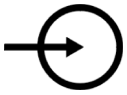
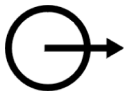
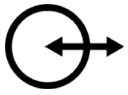
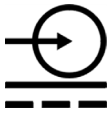
For detailed product security information, go to one of the following Web addresses:

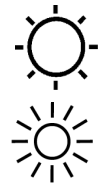
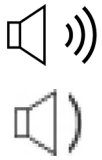
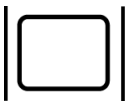
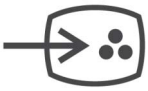
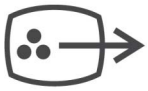
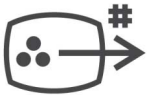
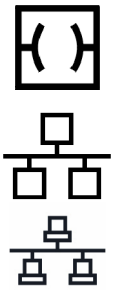
http://www.gehealthcare.com/usen/security

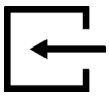
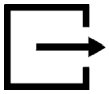
http://www.gehealthcare.com/usen/security/mds2.html

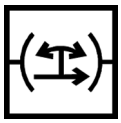
3.6 Equipment symbols

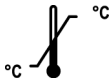
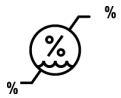
The following symbols appear on one or more of the devices.	
	Bell cancel. Audio off.
	Audio pause. Temporary audio off.
	General alarm.
	Fuse. Replace with identical type and rating fuse.
	Do not reuse.
	Battery (monitor): The flashing orange symbol indicates that there is a battery failure/missing battery.
	Battery (monitor): The solid orange symbol indicates that the battery is being charged.
	Battery (monitor). The solid green symbol indicates that the monitor is being used on battery power.
	Battery (monitor): The battery slot cover is open/closed.
	Battery (monitor): Test button on the battery to check the battery charge level.

The following symbols appear on one or more of the devices.	
	Battery (monitor). Located on the battery slot cover.
	Battery (PDM).
	Communication. (PDM)
	Power indicator. (PDM)
	On/standby button.
	Standby or power indicator.
	Signal/power input.
	Signal/power output.
	Signal/power input/output (combined).
	ON. Power connection to the mains.
	Power supply connector.
	Power switch.

The following symbols appear on one or more of the devices.	
	Display brightness controls.
	Display speaker volume controls.
	DVI connector. Video output connector for digital or analog source.
	Color display connector port.
	Color video input. Video input connector for digital or analog source.
	Color video output, digital. Video output for analog source.
	Color video output. Video output for digital source.
	USB connector.
	Ethernet connectors
	Serial interface.

The following symbols appear on one or more of the devices.	
	Tram-Net and ePort connector for PDM module, E-module frame, Tram-Rac housing, and TRAM modules.
	Gas inlet.
	Gas outlet.
	Press to open.
	Zero all. (PDM)
IPX1	Degree of ingress protection. Degree of protection against harmful ingress of water: Components not marked with an IPXn code are rated as Ordinary (no protection against fluid ingress). All other IPXn rated components have the degree of protection per the 'n' rating.
	Latex free.
	D-lite/Pedi-lte: Add date.
	Home. Return to the main display.
	Alternating current. Green symbol on the B650 and B450 monitor front panel: the monitor is being used on mains power.
	Direct current.
	Equipotentiality. Connect device to a potential equalization conductor.

The following symbols appear on one or more of the devices.	
	Protective earth ground. Connectors grounded to the AC power source.
    	Defibrillator synchronization connectors.
	(WLAN) Class 2 Identifier
   	Stacking limit by number.
	Date of manufacture. This symbol indicates the date of manufacture of this device. The first four digits identify the year and the last two digits identify the month.
	Manufacturer name and address.
	Batch or lot number.
lbl p/n	Abbreviation for label part number.

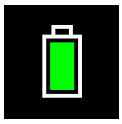
The following symbols appear on one or more of the devices.	
REF	Catalogue or orderable part number.
SN	Device serial number.
	Atmospheric pressure limitations.
	Temperature limitations.
	Humidity limitations.
	Keep dry. Protect from rain.
	Fragile. Handle with care.
	This way up.
	This symbol indicates that the waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment.
	Recycled materials or may be recycled.
	Recyclable Lithium-ion.
	Mercury. This product consists of devices that may contain mercury, which must be recycled or disposed of in accordance with local, state, or country laws. (Within this system, the backlight lamps in the patient monitor display contain mercury.)

The following symbols appear on one or more of the devices.	
EC REP	European authorized representative.
CE	European Union Declaration of Conformity.
C US	Indicates that the product is certified for both the U.S. and Canadian markets, to the applicable U.S. and Canadian standards.
FC	FCC. USA only. Complies with applicable US government (Federal Communications Commission) radio-frequency interference regulations.
Rx ONLY U.S.	Prescriptive Device. USA only. For sale by or on the order of a Physician.
PC	Russia only. GOST-R mark.
Segurança Compulsório	Brazil only. INMETRO certificate.
50 20 10 5	NOTE: The following symbols (required by China law only) are representative of what you may see on your equipment. The number in the symbol indicates the EFUP period in years, as explained below. Check the symbol on your equipment for its EFUP period. This symbol indicates the product contains hazardous materials in excess of the limits established by the Chinese standard SJ/T11363-2006 Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Products. The number in the symbol is the Environment-friendly User Period (EFUP), which indicates the period during which the toxic or hazardous substances or elements contained in electronic information products will not leak or mutate under normal operating conditions so that the use of such electronic information products will not result in any severe environmental pollution, any bodily injury or damage to any assets. The unit of the period is “Year”.

The following symbols appear on one or more of the devices.	
	In order to maintain the declared EFUP, the product shall be operated normally according to the instructions and environmental conditions as defined in the product manual, and periodic maintenance schedules specified in Product Maintenance Procedures shall be followed strictly. Consumables or certain parts may have their own label with an EFUP value less than the product. Periodic replacement of those consumables or parts to maintain the declared EFUP shall be done in accordance with the Product Maintenance Procedures. This product must not be disposed of as unsorted municipal waste, and must be collected separately and handled properly after decommissioning.
	This symbol indicates that this electronic information product does not contain any toxic or hazardous substance or elements above the maximum concentration value established by the Chinese standard SJ/T11363-2006, and can be recycled after being discarded, and should not be casually discarded.
	Underwriters Laboratories product certification mark.
IC	Canada only. Industry Canada certification number indicates that this product meets the applicable Industry Canada technical specifications.
CMIIT ID	China only. China Ministry of Industry and Information Technology identification number for Radio Transmission Equipment Type Approval.
N410	Australia only. The product complies with the applicable Australian standard and establishes a traceable link between the equipment and the manufacturer, importer or their agent responsible for compliance.
	Japan only. Approved under Japan TELEC requirements.
ANATEL HHHH - AA - FFFF (01) 0789 RRRRRR PPP D	Brazil only. Approved under ANATEL (Agência Nacional de Telecomunicações) requirements.
ICASA	South Africa only. Approved under ICASA (Independent Communications Authority of South Africa) requirements.
KCC-XXX-XXX-XXXXXXXXXXXX	Korea only. Approved under KCC (Korea Communications Commission) requirements.

3.7 User interface symbols

The following symbols appear in the software user interface	
	Alarm off indicator. Displays in the upper right corner of the parameter window and in the Alarms Setup menu when physiological alarms for this parameter are turned off. The symbol is not displayed at the central station or on a remote bedside monitor.
	Alarm priority indicator: High (red). Indicates a high priority alarm.
	Alarm priority indicator: Medium (yellow). Indicates a medium priority alarm.
	Alarm priority indicator: Low (cyan). Indicates a low priority alarm.
	Alarm volume icon. Adjust the minimum alarm tone volume.
	Audio alarms off indicator - Displays in the upper left corner of the alarm area when physiological audible alarms are turned off.
	Audio alarms paused indicator with countdown timer - Indicates all audio alarms are paused and the amount of time remaining for the alarm pause period displays as a countdown timer. Displays in the upper left corner of the screen.
	Pause audio alarms - Selectable from the monitor's main menu. Also an indicator of a temporarily paused active audio alarm.
	Low priority audio off alarm indicator, Displays in the upper left corner of the alarm area.
	Configuration warning. Displays when the priority setting for ***HR/PR high/low***, or ***SpO2 low*** has been set to low. Check the alarm configuration. Displays in the upper left corner of the alarm area.
	General warning sign. Displays when the priority setting for ***HR/PR high/low***, or ***SpO2 low*** has been set to low. Displays in the lower part of the parameter menu's ***Alarms*** tab, and in the Priority column of the selected alarm in the ***Alarms Setup > Alarm Priorities***.

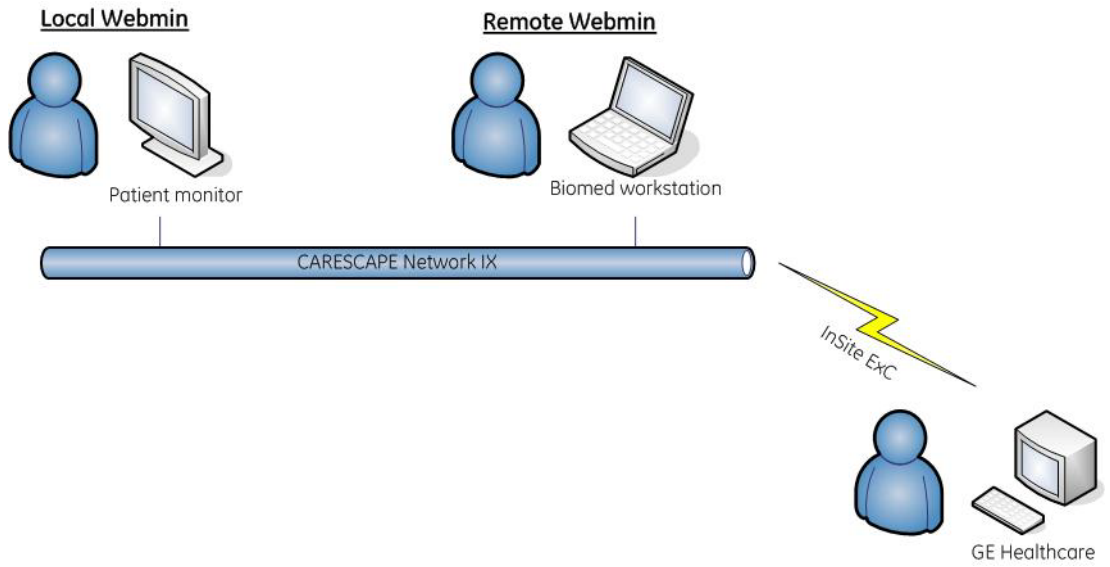
The following symbols appear in the software user interface	
	Reminder volume icon. Adjust the volume of the tone that sounds every two minutes when audio alarms are turned off.
	Touch volume icon. Adjust the volume of the tone that sounds when a user touches a touchscreen display.
	Home icon. Close all menus/applications displayed on the patient monitor.
	Locking setting indicator. Indicates this setting is locked and cannot be adjusted.
	Network connection indicator. Indicates the patient monitor is connected to the Local Area Network (LAN).
	Network connection indicator. Indicates the monitor is connected to the Wireless Local Area Network (WLAN).
	Network (WLAN) signal strength. The number of segments corresponds to the signal strength: four segments indicate strong signal, one segment weak signal.
	Monitor battery is full.
	Monitor battery (green). The higher the charge, the bigger the green bar within the symbol. Numbers indicate the remaining run time.
	Monitor battery (yellow). This symbol and a message indicating low battery charge appear when there is less than 20 minutes of run time left.
	Monitor battery (red). This symbol and a message indicating empty battery appear when there is less than 5 minutes of run time left.

The following symbols appear in the software user interface	
	Monitor battery is charging. There is a white running bar inside the symbol.
	Monitor battery failure indicator. Indicates a missing battery or a battery failure.
	PDM battery charging indicator. Indicates that the PDM battery is charging.
	PDM battery gauge indicator. Indicates the charge level of the battery.
	PDM battery failure indicator. Indicates the battery is not available for use.
	Snapshot indicator. Indicates the event has an associated snapshot.
	Beat volume icon. Adjust the volume of the QRS beep tone. Also the beat source indicator. Displays next to the selected beat source.
	Respiration indicator. Indicates a breath is detected by the impedance respiration algorithm.
	BIS and Entropy sensor impedance check indicator (gray). Displays for each sensor as the impedance check is in progress.
	BIS and Entropy sensor impedance check error indicator (red). Indicates the specified sensor failed the impedance check.
	BIS and Entropy sensor impedance check passed indicator. Indicates the specified sensor passed the impedance check.

The following symbols appear in the software user interface	
	Completed NIBP volume icon. Adjust the volume of the tone that sounds when an NIBP measurement result is available.
	Manual NIBP icon. Start a manual NIBP measurement.
	Nellcor OxiMax SatSeconds indicator. Indicates the amount of time the SpO_2 saturation is outside the limits before alarms are generated.
	SpO_2 signal strength indicator. Indicates the signal strength, with three asterisks indicating the strongest signal.
	NMT Stimulus beep volume icon. Adjust the volume of the tone that sounds when a stimulus pulse is generated.
	Progress bar. Indicates the amount of time remaining until the next automatic measurement.

4 Using Webmin service interface

Webmin is a browser-based service interface that is used to configure the platform settings of the patient monitor and to diagnose and retrieve system information for maintenance and troubleshooting.



Local access to Webmin

You can access Webmin locally through the integrated browser on the patient monitor or from a configured service PC that is connected to the IX port of the patient monitor with an Ethernet crossover cable.

Remote Webmin

You can access Webmin remotely from a configured service PC that is connected to the patient monitor over the IX Network.

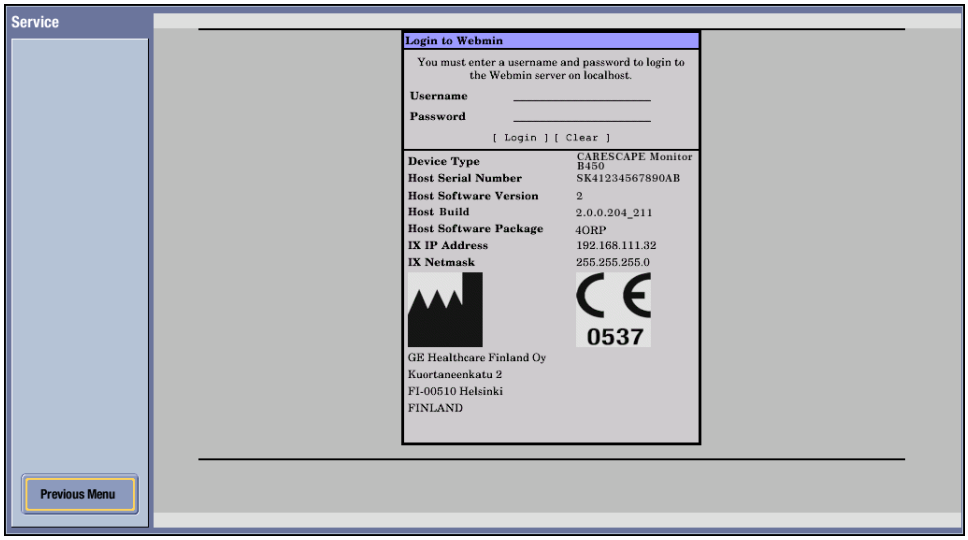
Requirements for service PC

- Network board with Ethernet port and TCP/IP network installed.
- Internet Explorer V6 or later.

4.1 Local access to Webmin using the integrated browser on the patient monitor

NOTE: A USB keyboard and mouse are needed to access the integrated Webmin browser.

1. Select ***Monitor Setup*** > ***Service***. The local browser opens and displays the ***Login to Webmin*** dialog box.



2. Continue to 4.4. Login to Webmin.

Closing Webmin

Select to close Webmin and return to the main display.

4.2 Local access to Webmin with a service PC

You can access Webmin locally by connecting an Ethernet crossover cable between the service PC and the IX connector of the patient monitor.

NOTE: If you disconnect the patient monitor from a live IX Network when a patient is admitted, you will temporarily lose the services provided by the IX Network, e.g., access to the IX printers and MUSE reports.

WARNING **Non-medical equipment does not provide the same level of protection against electrical shock. Do not touch the patient and any part of non-medical equipment at the same time. Some examples of non-medical equipment are laser printers and non-medical computers.**

1. Connect a service PC to the IX connector on the patient monitor using a crossover cable.
2. In patient monitor, select ***Monitor Setup*** > ***Service***. The local browser opens and displays the ***Login to Webmin*** dialog box.
3. Record the IX IP address of the patient monitor:

   IX IP address: _____

   IX Netmask: _____

NOTE: If the IX IP address field is shown as 0.0.0.0., you need to configure the patient monitor's IX Network address first. Access Webmin using the integrated browser and configure a static IP address for the IX Network.

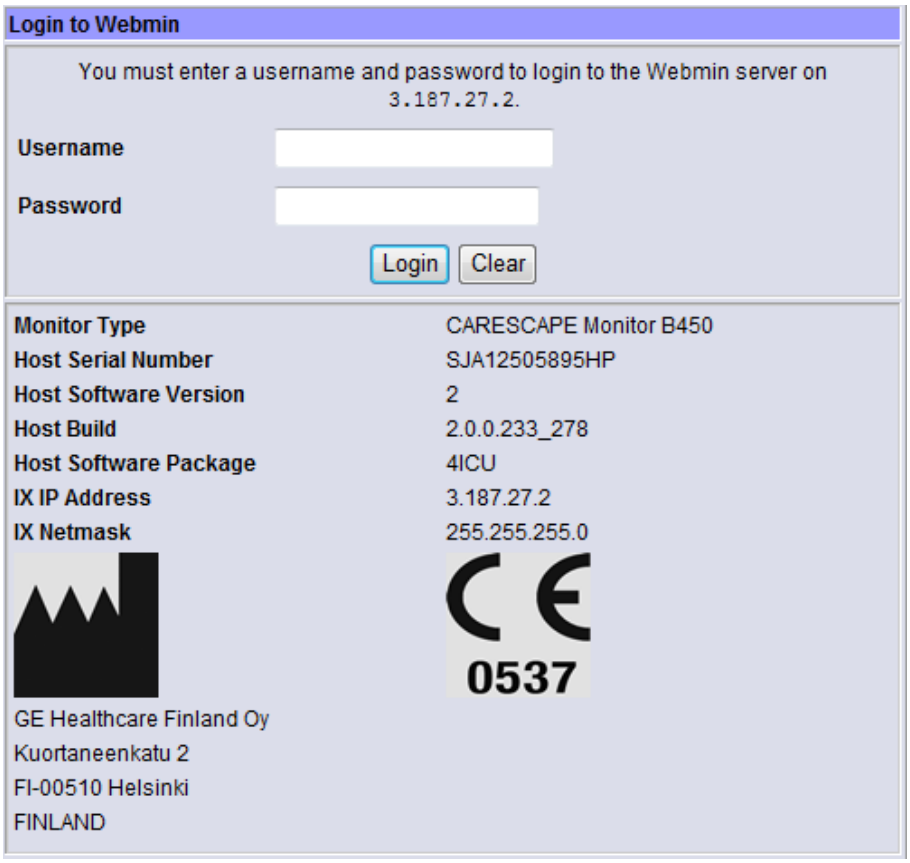
4. Configure the service PC's IP address and subnet mask to the same network segment with the patient monitor's IX Network setting.

NOTE: For more information on how to configure the IP address, refer to the PC's documentation.

5. Launch a web browser on the service PC.
6. In the ***Address*** field, type **https://[IX IP address]:10000** and press **Enter**.

NOTE: **[IX IP address]** is the IX Network IP address of the patient monitor.

The ***Login to Webmin*** dialog box displays.



7. Continue to 4.4. Login to Webmin.

Closing Webmin

1. Restore the patient monitor's original IX Network configuration and service PC's network settings if they were changed.
2. Disconnect the crossover cable from the patient monitor and from the service PC.
3. Reconnect the patient monitor back to the IX Network if applicable.

4.3 Remote access to Webmin using a service PC over the IX Network

1. Connect a service PC to the IX Network using a standard network cable.
2. In patient monitor, select ***Monitor Setup*** > ***Service***. The local browser opens and displays the ***Login to Webmin*** dialog box.

3. Record the IX IP address of the patient monitor:
   IX IP address: _____

   IX Netmask: _____

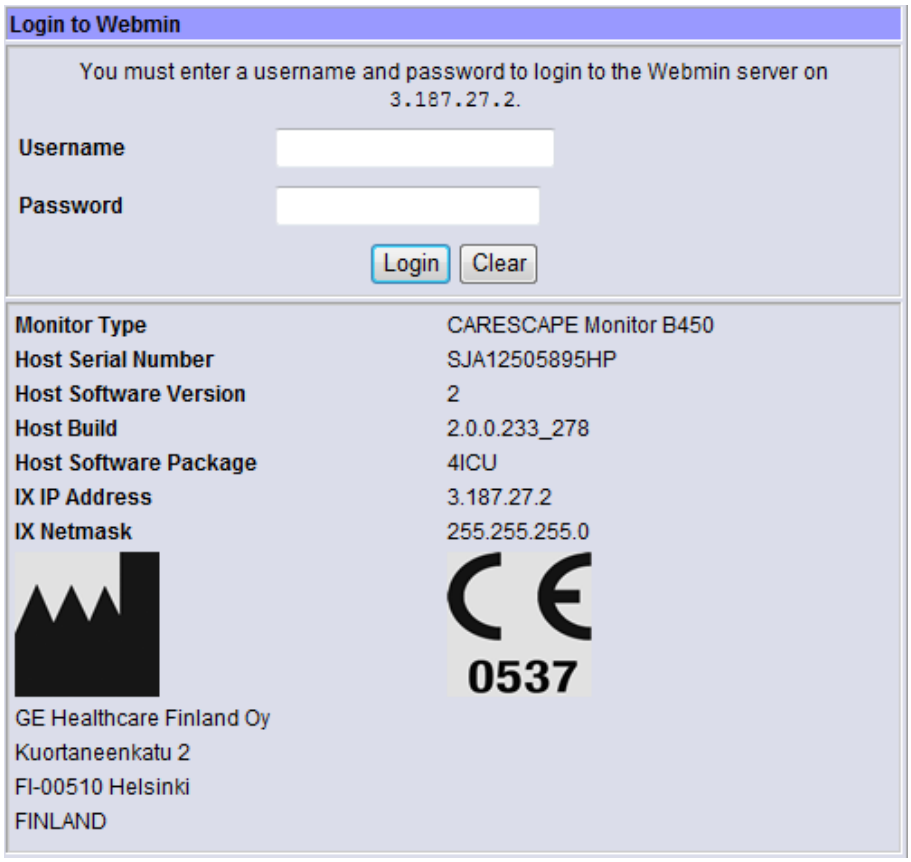
4. Configure the service PC's IP address and subnet mask to the same network segment with the patient monitor's IX Network.

NOTE: For more information on how to configure the IP address, refer to the PC's documentation.

5. Launch a web browser on the service PC.
6. In the ***Address*** field, type **https://[IX IP address]:10000** and press **Enter**.

NOTE: **[IX IP address]** is the IX Network IP address of the patient monitor.

The ***Login to Webmin*** dialog box displays.



7. Continue to 4.4. Login to Webmin.

Closing Webmin:

1. Restore the original network settings in the service PC.
2. Disconnect the service PC from the live IX Network.

4.4 Login to Webmin

1. In the ***Login to Webmin*** dialog box, type the username and password and select ***Login*** or press **Enter**.

   Username: **biomed**
   Password: **Change**<space>**Me**

NOTE: Username and password are case sensitive.

NOTE: "Change Me" is the factory default password for the username "biomed". Refer to section 7.14. Changing passwords for details on how to change the default password.

The Webmin application opens and defaults to the ***Information*** tab.

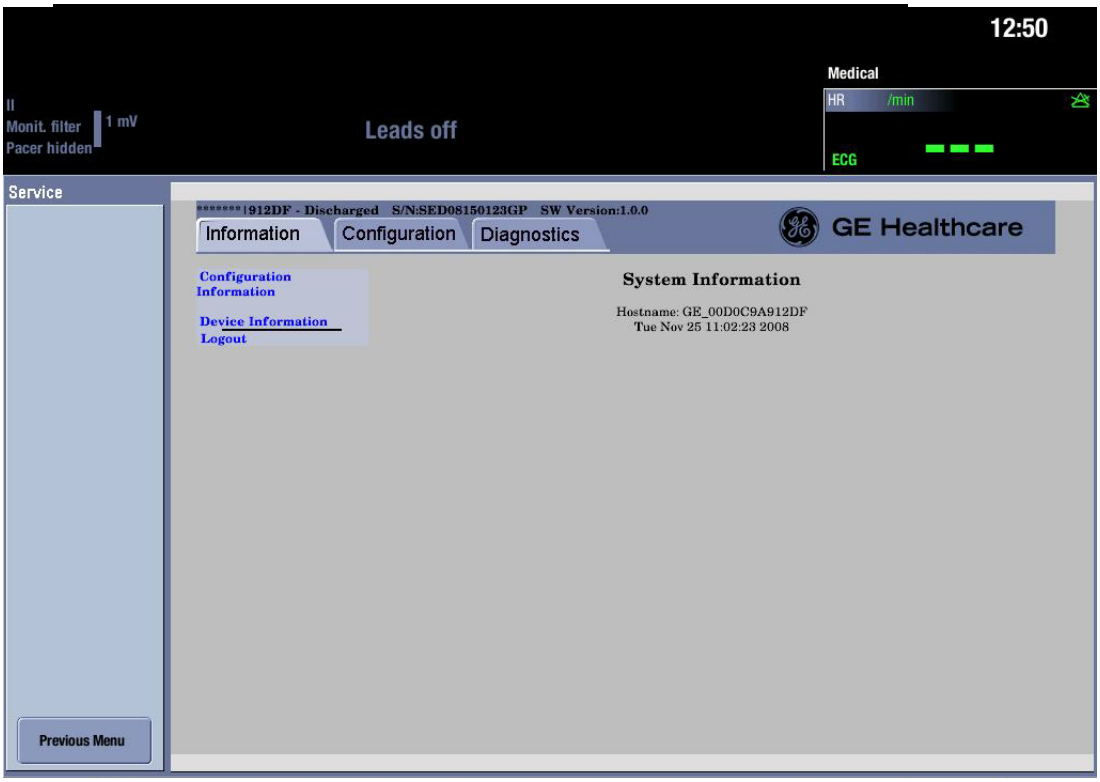
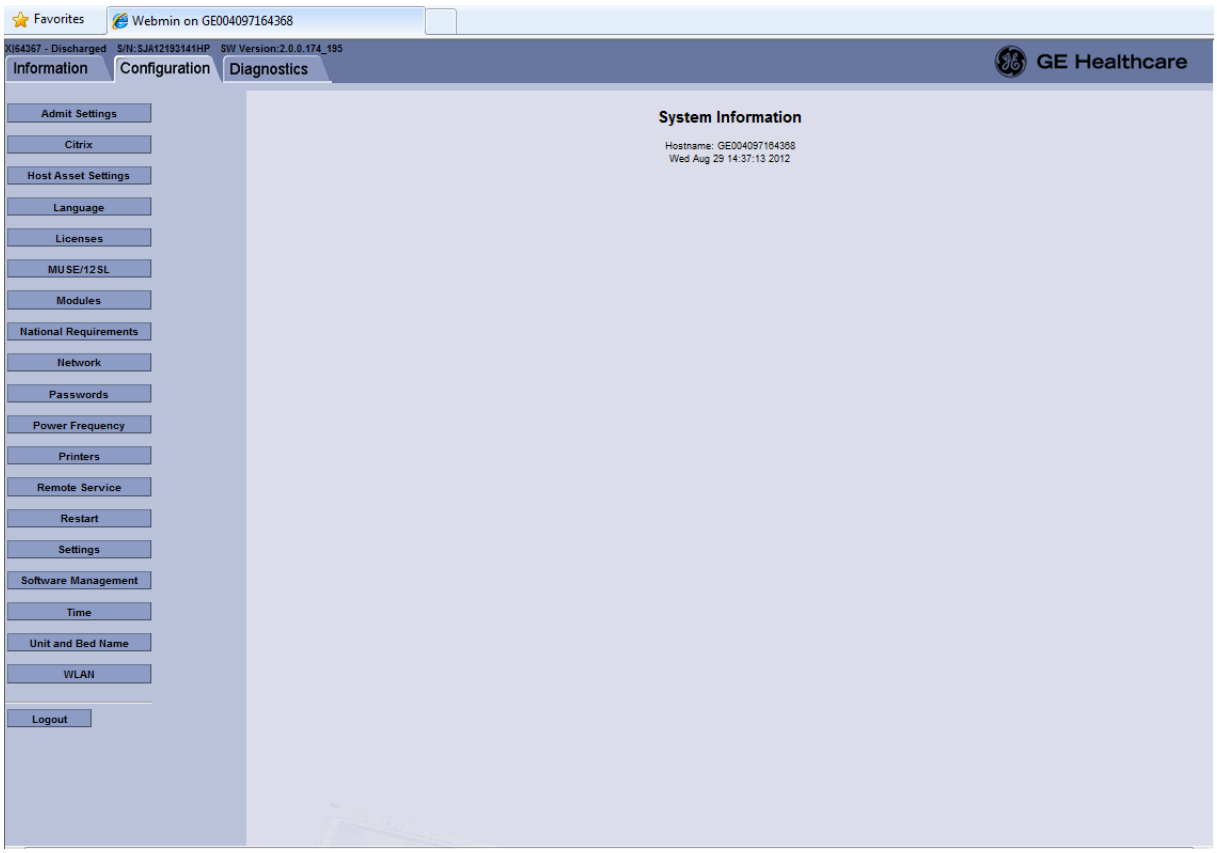


Figure 1 Webmin user interface when accessed using the integrated browser

Figure 2 Webmin user interface when accessed using the service PC

4.5 Webmin configuration modules



The Webmin service interface includes the following configuration modules. Select ***Help*** for additional information related to each Webmin module.

Webmin module	Use the module
Admit Settings	to configure Patient ID Prefix and barcode settings.
Citrix	to configure the Citrix client settings for the iPanel software: server address, initial program, Citrix session timeout, username, password, encryption level
Host Asset Settings	to enter a host asset number and to view the host serial number.
Language	to select the language used in clinical user interface and to select the keyboard locale setting for the alphanumeric keyboard and the barcode reader.
Licenses	to enable and activate a software package, to enable and activate software features and to upload and activate a license file.
MUSE/12SL	to configure the host for sending and viewing 12SL information.
Modules	to configure some acquisition module specific settings after corrective maintenance, or for administrative purposes. These settings are saved to the permanent memory of the related acquisition module and the settings travel with the module from one patient monitor to another. Refer to the Module Frames and Modules Technical Manual for detailed information how to change these settings.
National Requirements	to activate France specific defaults for the ECG HR adjustment range and the reminder beep behavior.
Network	to select and configure the real-time network as the MC Network (CARESCAPE Network) or S/5 Network. It also allows the user to configure the IX Network settings.
Passwords	to change the passwords for the biomed and clinical users.
Power frequency	to set the power line frequency.
Printers	to configure the patient monitor to print to up to 12 laser printers connected on the IX Network. There are sub-modules for installing a printer, deleting a printer and for printing a test page.
Remote Service	to configure and control the Insite with Exc remote service tool.
Restart	to shutdown and restart the patient monitor automatically via Webmin. NOTE: The patient must be discharged in order to enable monitor restart via Webmin.

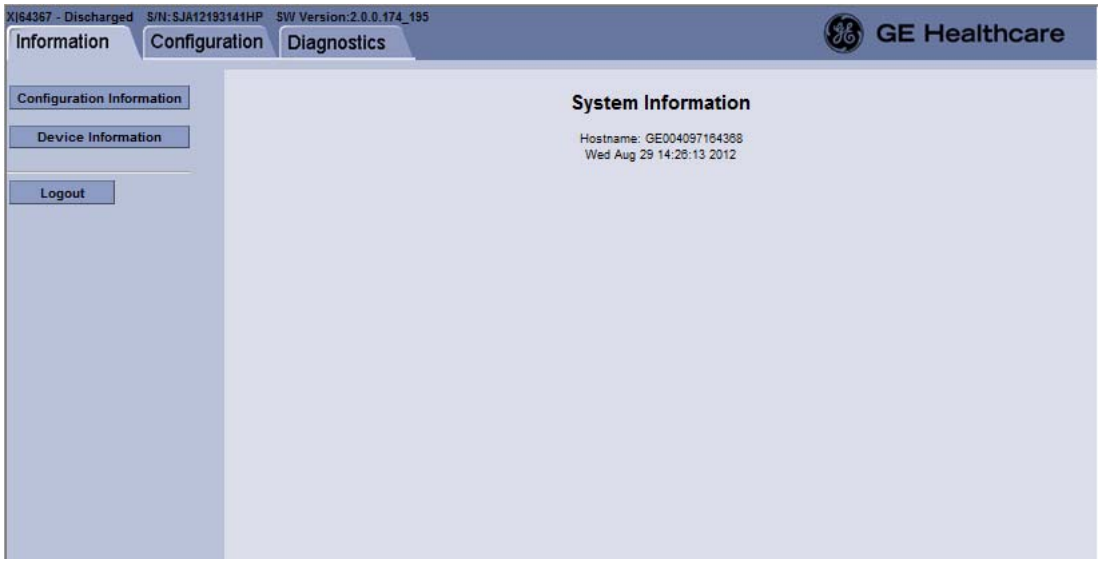
Webmin module	Use the module
Settings	to transfer platform and/or clinical settings from one patient monitor to another, to take backup copies of the settings to an external device and to restore the settings from an external device.
Software Management	to update patient monitor and parameter module software.
Time	to set the date and time settings.
Unit and bed name	to configure the care unit name and bed name for patient monitors that are configured to connect to the MC Network.
WLAN	to configure the WLAN client settings for the MC Network or S/5 Network.

4.6 Webmin information modules

The Webmin information modules provide useful information about the patient monitor setup especially for troubleshooting.

The Configuration Information module shows the current platform configuration of the patient monitor and the connected peripheral devices.

The Device Information module shows the hardware and software information of the patient monitor and the connected peripheral devices.



4.7 Webmin diagnostics modules

Access Webmin service interface to view hardware statistics, ping a network device, view WLAN diagnostics and view or download log files.

The Hardware Statistics module displays several internal voltages, temperatures and power consumption.

Ping a TCP/IP network device- Use this Webmin feature to verify connectivity with a network device on the MC Network and IX Network.

Log files - The patient monitor collects information about different system events and errors to log files. These log files help troubleshooting problems in the patient monitor and the connected peripheral devices.

WLAN diagnostics-Use this Webmin feature for troubleshooting WLAN related problems. This Webmin module provides information about the WLAN driver, WLAN status and the detected access points.

For your notes:

5 Pre-installation requirements

This chapter specifies the pre-installation requirements for the patient monitor.

5.1 Unpacking

1. Confirm that the packing box is undamaged. If the box is damaged, contact the shipper.
2. Open the top of the box and carefully unpack all components.
3. Confirm that all components are undamaged. If any of the components is damaged, contact the shipper.
4. Confirm that all components are included. If any of the components is missing, contact your GE Healthcare distributor.

WARNING **EXCESSIVE LEAKAGE CURRENT - If the device has been transported or stored outside operating temperature range allow it to stabilize back to operating temperature range before removing it from the plastic bag.**

CAUTION PACKAGING DISPOSAL - Dispose of the packaging material, observing the applicable waste control regulations.

5.2 Compatibility check

Verify the compatibility of all system components prior to the installation of the patient monitor.

- Refer to the patient monitor's supplemental information manual for a list of compatible network and bedside devices.
- Refer to the patient monitor's supplemental information manual for a list of compatible supplies and accessories.
- Refer to the patient monitor's supplemental information manual and Unity Network Interface Device (ID) Operator's Manual to see compatible peripheral devices.

WARNING **BEFORE INSTALLATION - Compatibility is critical to safe and effective use of this device. Please contact your local sales or service representative prior to installation to verify equipment compatibility.**

WARNING **INTERFACING OTHER EQUIPMENT - Connect only items that are specified as part of the system and as compatible. For more information, see the CARESCAPE Modular Monitors Supplemental Information Manual.**

WARNING **Before connecting an interfacing module to the device, verify compatibility. Verify the connectivity of device interfaces before using the equipment. Verify the compatibility of software versions before using the equipment.**

WARNING **Do not use identical measurement modules or modules that map a measurement to the same channel or parameter window. If such modules have been connected, remove the module that has been most recently connected. You can also remove both modules and re-connect the new module after five seconds.**

WARNING **The use of accessories, transducers and cables other than those specified may result in increased emissions or decreased immunity performance of the equipment or system.**

WARNING **For detailed instructions and information regarding supplies and accessories, always refer to their own instructions for use.**

5.3 Network infrastructure

Ensure that the applicable network infrastructure is in place prior to the installation of the patient monitor.

Acquire the network configuration information from the hospital IT or the related project documentation and installation files.

5.3.1 MC Network

- The MC Network infrastructure shall be installed according to the CARESCAPE Network Configuration Guide.
- The installation site of the patient monitor shall have a wall jack and a network patch cable for the MC Network.
- Refer to the sections 7.2.2. Selecting and configuring CARESCAPE Network and 7.4. Setting unit and bed name to see the configuration information you need to have available to configure the patient monitor to the MC Network.

5.3.2 Wireless MC Network

- The wireless MC Network infrastructure shall be installed according to the CARESCAPE Wireless Network Configuration Guide.
- Ensure that the wireless coverage area is adequate for the installation.
- Refer to the sections 7.2.2. Selecting and configuring CARESCAPE Network, 7.2.4. Configuring WLAN and 7.4. Setting unit and bed name to see the configuration information you need to have available to configure the patient monitor to the wireless MC Network.

5.3.3 S/5 Network

- The S/5 Network shall be installed according to the S/5 Network Installation Guide. Refer to the iCentral and iCentral Client Service Manual for iCentral installation instructions.
- The installation site of the patient monitor shall have a wall jack and a network patch cable for the S/5 Network.
- Refer to the section 7.2.3. Selecting and configuring S/5 Network to see the configuration information you need to have available to configure the patient monitor to the wired S/5 Network.

5.3.4 S/5 Wireless Network

- The S/5 Wireless Network shall be installed according to the S/5 Network Installation Guide. Refer to the iCentral and iCentral Client Service Manual for iCentral installation instructions.
- Ensure that the wireless coverage area is adequate for the installation.

- Refer to the sections 7.2.3. Selecting and configuring S/5 Network and 7.2.4. Configuring WLAN to see the configuration information you need to have available to configure the patient monitor to the S/5 Wireless Network.

5.3.5 IX Network

- The IX Network infrastructure shall be installed according to the CARESCAPE Network Configuration Guide.
- The installation site of the patient monitor shall have a wall jack and a network patch cable for the IX Network.
- Refer to the section 7.2.2. Selecting and configuring CARESCAPE Network to see the configuration information you need to have available to configure the patient monitor to the IX Network.
- Refer to the following sections for the information you need to have available for:
  - 7.5. Configuring printers for IX printer configuration
  - 7.6. Configuring Citrix
  - 7.7. Configuring MUSE/12SL
  - 7.16.1. Configuring the remote service for Insite with Exc configuration.

5.4 Installing the mounting hardware

Ensure that all the applicable/ required mounting hardware is properly installed prior to the installation of the patient monitor:

- Mounting hardware for the patient monitor, either for a stand-alone installation or for an installation to an anesthesia machine or to a ventilator.
- Mounting hardware for the PSM module
- Mounting hardware for the PDM module
- Mounting hardware for the displays
- Mounting hardware for the Unity Network ID connectivity device

NOTE: Refer to the patient monitor's supplemental information manual for compatible mounting hardware for each system component above.

WARNING **Use only manufacturer specified mounts.**

5.5 Unity Network ID connectivity device installation

The Unity Network ID connectivity device shall be properly installed, configured and tested according to the Unity Network ID Connectivity Device Service Manual prior to connecting it to the patient monitor.

Make sure that the Unity Network ID connectivity device is configured as follows:

- IP address is 192.168.253.x, where x is a number between 2 and 254.
- Netmask is 255.255.255.0
- The location of the Unity Network ID is set to a value other than the default (XXXX-XXX). For example, BAY3|UNID3+.

Refer to the Unity Network Interface Device (ID) Service Manual for instructions on checking and changing the IP address.

5.6 Power and environmental requirements

Check the patient monitor's supplemental information manual for power and environmental requirements.

WARNING **Operation of the monitor outside the specified performance range may cause inaccurate results.**

CAUTION Do not use or store equipment outside the specified temperature, humidity, or altitude ranges.

Power requirements

- The installation site shall have hospital-grade grounded power outlets and power cords for all system components.

WARNING **EXCESSIVE LEAKAGE CURRENT - A display or printer that is a non-medical grade device and is used within the patient environment, must always be powered from an additional transformer providing at least basic isolation (isolating or separating transformer). Using without an isolating transformer could result in unacceptable enclosure leakage currents.**

Environmental requirements

- Install the patient monitor to a location that meets the specified environmental requirements of operating temperature, humidity and atmospheric pressure.
- Set up the device in a location which affords sufficient ventilation. The ventilation openings of the device must not be obstructed.

EMI & RFI interference:

WARNING **Do not use the monitor in high electromagnetic fields (for example, during magnetic resonance imaging).**

WARNING **Other equipment may interfere with the system, even if that other equipment complies with CISPR emission requirements.**

CAUTION EMC - Magnetic and electrical fields are capable of interfering with the proper performance of the device. For this reason make sure that all external devices operated in the vicinity of the monitor comply with the relevant EMC requirements. X-ray equipment or MRI devices are a possible source of interference as they may emit higher levels of electromagnetic radiation. Changes or modifications to this device/system not expressly approved by GE may cause EMC issues with this or other equipment. This device/system is designed and tested to comply with applicable standards and regulations regarding EMC and needs to be installed and put into service according to the EMC information stated as follows: This device/system is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes. Mains power should be that of a typical commercial or hospital environment. Device is compliant to Class A.

CAUTION Use of known RF sources, such as cell/portable phones, or other radio frequency (RF) emitting equipment near the system may cause unexpected or

adverse operation of this device/system. Consult qualified personnel regarding device/system configuration.

- The patient monitor should be isolated from sources of strong electromagnetic and radio frequency interference.

NOTE: Refer to the patient monitor's supplemental information manual for more information.

For your notes:

6 Hardware installation

CAUTION LOSS OF MONITORING - Leave space for circulation of air to prevent the monitor from overheating. The manufacturer is not responsible for damage to equipment caused by improperly vented cabinets, improper or faulty power, or insufficient wall strength to support equipment mounted on such walls.

WARNING **The parameter modules are not able to withstand unpacked drops from a height of 1 m without damage. If a module is dropped, please service it before taking it back into use.**

WARNING **After transferring or reinstalling the monitor, always check that it is properly connected and all parts are securely attached.**

WARNING **SITE REQUIREMENTS - Do not route cables or tubing in a way that they may present a stumbling hazard.**

WARNING **EXPLOSION - Do not use this equipment in the presence of flammable anesthetics, vapors or liquids.**

WARNING **EXCESSIVE TOUCH CURRENT - To avoid excessive patient leakage current, do not simultaneously touch the patient and the electrical connectors located at the rear panel of the monitor or within the module housing or frames.**

6.1 Installing a battery into the patient monitor and the PDM module

The batteries for the patient monitor and the PDM module, if included, are shipped separately and need to be installed and fully charged prior to taking into use.

WARNING **PHYSICAL INJURY- Make sure the battery is completely inserted and the battery door is completely closed. Falling batteries could seriously or fatally injure neonatal or other vulnerable patients.**

WARNING **EXPLOSION OR FIRE -Using non-recommended batteries could result in injury/burns to the patients or users. Only use batteries recommended or manufactured by GE.**

WARNING **EXPLOSION HAZARD - Do not incinerate a battery or store at high temperatures. Serious injury or death could result.**

NOTE: Refer to section 10.4. Monitor battery maintenance in this manual for maintenance instructions of the patient monitor battery. Refer to the Module Frames and Modules Technical Manual for information about PDM battery maintenance.

6.1.1 Testing the battery charge

Before installing a battery, verify the battery's state of charge. Press the green **TEST** button on the battery. The number of charge level indicator LEDs that illuminate indicates the approximate charge remaining in the battery.

– Four LEDs illuminated: 75% – 100% of full-charge capacity.

– Three LEDs illuminated: 50% – 74.9% of full-charge capacity.
– Two LEDs illuminated: 25% – 49.9% of full-charge capacity.
– One LED illuminated: 10% – 24.9% of full-charge capacity.
– One LED flashing: < 10% of full-charge capacity remaining.

NOTE: Before taking the patient monitor into use for the first time, the batteries should be fully charged. Keep the PDM connected to the patient monitor and the patient monitor connected to the AC mains until the batteries are fully charged.

6.1.2 Installing the battery into the patient monitor

WARNING **The patient monitor must always be used with a battery inserted. This will ensure the functioning of the monitor and prevent data loss during possible supply mains interruptions.**

1. Open the battery cover by pressing the battery cover release latch down and pulling the battery door open.
2. Insert the batteries, one at time, with the test indicator facing to front and the connector end first all the way into the battery slot.
3. Close the battery door carefully.

6.1.3 Installing the battery into the PDM module

1. Open the battery door by gently pulling on the battery door pull tab.

2. Pull the battery tray out of the PDM using the battery tray strap.
3. Insert the battery with the **TEST** button facing up and the arrow pointing into the PDM.

4. Press the battery door closed until it seals the battery compartment.

6.2 Mounting the patient monitor

The patient monitor has an integrated GCX mounting plate. This facilitates all mounting options for the patient monitor. Refer to the CARESCAPE Modular Monitors Mounting Solutions to identify the compatible mounting hardware for the patient monitor.

Install the patient monitor to the mounting hardware according to the installation instructions included with the mounting hardware.

WARNING **Never install equipment above the patient.**

WARNING **Use only manufacturer specified mounts.**

WARNING **To prevent liquids from entering the monitor, do not tilt the monitor more than +/-15 degrees.**

CAUTION The device/system should not be used adjacent to, or stacked with, other equipment. Consult qualified personnel regarding device/system configuration.

6.3 Connecting a secondary display

The patient monitor supports one independently configurable secondary display.

WARNING **Do not connect a monochrome display to the monitor. Visual alarm indicators may not appear properly.**

WARNING **The secondary display will not sound the audible alarms.**

WARNING **To prevent liquids from entering the display, do not tilt the display more than +/-15 degrees.**

WARNING **Use only manufacturer specified mounts.**

NOTE: Refer to the patient monitor's supplemental information manual for a list of compatible secondary displays.

NOTE: Refer to the display's user manual for more information about the display installation.

NOTE: Ensure that the display is installed to the mounting hardware according to the installation instructions included with the mounting hardware.

NOTE: Make sure that all cables are securely connected.

NOTE: Refer to the CARESCAPE Modular Monitors User's Manual for information how to setup the screens: ***Monitor Setup > Default Setup > Care Unit Settings > Screens***.

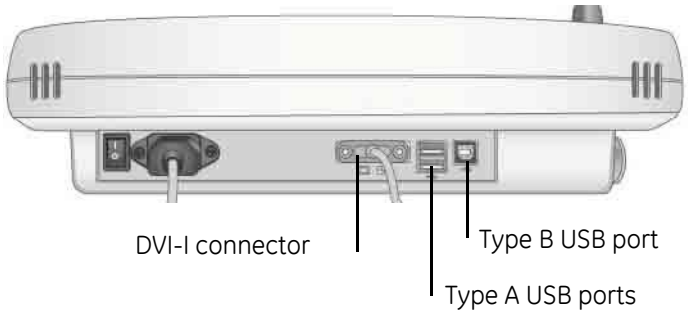
NOTE: Refer to section 7.1 for information about touchscreen calibration and display adjustments.

NOTE: All installations should be compliant with IEC 60601-1-1 and local electrical codes.

NOTE: The patient monitor with a non-medical grade display, which is IEC 60950-rated or equivalent, meets UL and IEC specifications if a medical grade isolation is used. If a non-medical grade display is to be used, the configuration must meet the IEC 60601-1-1 standard. Refer to IEC 60601-1-1 for requirements if using non-medical grade displays in the patient environment.

6.3.1 Connections to D15K and D19KT displays

The following instructions describe two methods to connect a D15K or D19KT display as a secondary display.



A) Cable length is less than 5 meters

1. Connect one end of the DVI-D to DVI-D video cable to the DVI-I connector on the bottom of the display and the other end to the DVI-D connector on the back of the patient monitor.
2. Connect the Type A plug of the standard USB cable to one of the downstream ports (Type A USB port) on the back of the patient monitor.

3. Connect the Type B plug of the standard USB cable to the upstream port (Type B USB port) on the bottom of the display.
4. Secure the USB cables connections to the displays according to the instruction included in the display package.

NOTE: A USB hub should not be used to connect the USB touchscreen to the patient monitor.

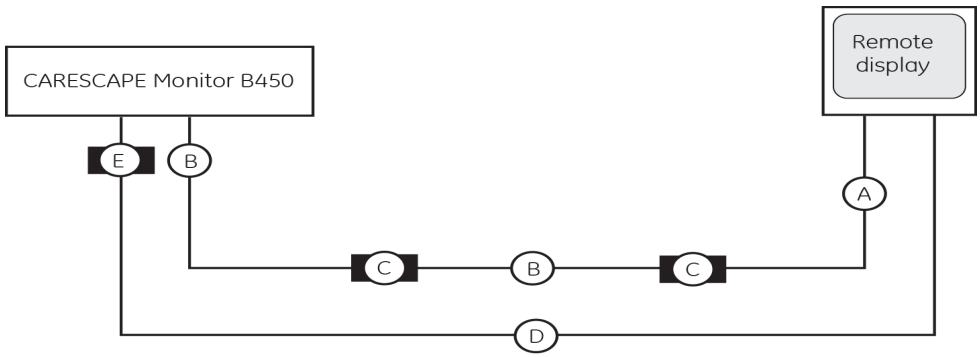
B) Cable length is 5 to 15 meters

If complete isolation is not required, this method will provide the most cost effective means of extending your USB installation. This type of installation should not be used for connections to non-medically used rooms according to IEC 60601-1-1.

Displays may be extended up to 15 meters from the patient monitor using the following cables:

– 15-meter DVI-I to DVI-I video cable with DVI-I to DVI-D adapter (p/n 2042766-001)..
– 5-meter USB extender (p/n 2042768-001)
– Standard USB-A to USB-B cable, up to 5 meters.

In the following example, two 5-meter USB extenders, plus a standard 5-meter USB cable extend the remote display up to 15 meters from the patient monitor.



A = standard USB cable (up to 5 m / 16 ft)
B = USB extender cable (5 m / 16 ft)
C = single port USB hub
D = DVI-I cable (15 m / 49 ft)
E = DVI-I to DVI-D adapter

USB-connection:

1. Connect the Type A plug of the 1st USB extender to one of the downstream ports (Type A USB port) on the back of the patient monitor.
2. Connect the Type A plug of the 2nd USB extender to the Type A receptacle on the 1st USB extender.
3. Connect the Type A plug of the standard USB cable to the Type A receptacle on the 2nd USB extender.

4. Connect the Type B plug of the standard USB cable to the upstream port (Type B USB port) on the bottom of the display.
5. Secure the USB cables connections to the displays according to the instruction included in the display package.

NOTE: The USB connection to the D15K and D19KT secondary display reserves one of the USB connectors in the rear panel of the patient monitor.

Video cable:

1. Connect one end of the 15-meter DVI-I to DVI-I video cable to the DVI-I connector on the bottom of the display.
2. Connect the DVI-I to DVI-D adapter to other end of the DVI-I cable.
3. Connect the DVI-I to DVI-D adapter to the DVI-D connector on the back of the patient monitor.

6.4 Installing parameter modules

Refer to the patient monitor's supplemental information manual to verify compatible parameter modules and to identify the parameter modules with identical measurements.

WARNING **Ensure that the CARESCAPE respiratory modules are in vertical position when used. Tilting them may result in erroneous readings.**

6.4.1 Installing a PSM or a PDM module

You can install a PSM or a PDM module either to the patient monitor or to a remote mounting solution.

Connecting a PSM or a PDM module to the patient monitor

1. Connect a module by aligning it with the insertion guides of the module rail unit on the back of the monitor.
2. Push the module into the frame until it clicks and stops.

Installing a PSM module to a pole mount:

Ensure that the Pole Mount for PSM is properly installed to an IV pole according to the installation guide included with the mounting hardware.

WARNING **PHYSICAL INJURY- Take care when mounting devices to an IV pole. If a device is mounted too high the IV pole may become unbalanced and tip over.**

1. Connect the PSM module to the Pole Mount for PSM as instructed in the accompanying installation guide.
2. Connect the Module Bus Adapter for PSM to the PSM connector in the patient monitor.
3. Connect the cable from the Pole Mount for PSM to the Module Bus Adapter for PSM.

Installing a PDM module to a mounting solution:

Ensure that the selected PDM mount is properly installed according to the installation instructions included with the mounting hardware.

1. Connect the PDM module to installed mounting hardware as instructed in the accompanying installation instructions.
2. Connect one end of the ePort cable to the PDM module ePort connector.
3. Connect the other end of the ePort cable to the ePort connector in the rear panel of the patient monitor.

WARNING **PHYSICAL INJURY — Do not install the PDM above a patient. Make sure the battery is completely inserted and the battery door is completely closed. Falling batteries could seriously or fatally injure neonatal or other vulnerable patients.**

WARNING **PHYSICAL INJURY — Do not install the PDM above a patient. Leaks from the battery cells can occur under extreme conditions. The liquid is caustic to the eyes and skin. If the liquid comes in contact with eyes or skin, flush with clean water and seek medical attention.**

Installing E-modules to the patient monitor

1. Connect a module by aligning it with the insertion guide inside the module slot.
2. Push the module into the frame until it locks.

6.5 Connecting to the mains power

WARNING **Use only AC power cords recommended or manufactured by GE.**

WARNING **EXCESSIVE LEAKAGE CURRENT - To avoid summation of leakage currents when interfacing the device with other equipment, the devices may only be**

interconnected with each other or to parts of the system when it has been determined by qualified biomedical personnel that there is no danger to the patient, the operator, or the environment as a result. In those instances where there is any element of doubt concerning the safety of the connected devices, the user must contact the manufacturers concerned (or other informed experts) for proper use. In all cases, safe and proper operation should be verified with the applicable manufacturer's instructions for use, and system standards IEC60601-1-1 must be complied with.

WARNING **Do not under any circumstances remove the grounding conductor from the power plug. Always check that power cord and plug are intact and undamaged.**

WARNING **POWER SUPPLY — The device must be connected to a properly installed power outlet with protective earth contacts only. If the integrity of the protective earth conductor is in doubt, disconnect the monitor from the power line, and use it with the battery power. All devices of a system must be connected to the same power supply circuit. Devices which are not connected to the same circuit must be electrically isolated when operated.**

CAUTION POWER REQUIREMENTS - Before connecting the device to the power line, check that the voltage and frequency ratings of the power line are the same as those indicated on the device's label. If this is not the case, do not connect the system to the power line until you adjust the device to match the power source. In U.S.A., if the installation of this equipment will use 240V rather than 120V, the source must be a center-tapped, 240V, single-phase circuit. This equipment is suitable for connection to public mains as defined in CISPR 11.

If a non-medical grade display is used as a display within the patient environment it must always be powered from an additional transformer providing at least basic isolation.

1. Connect power cords to the mains power supply inlet and to a wall outlet on all system components that require AC mains power input.
2. Do not power on any devices.

NOTE: Be sure that all power cords are securely connected and that they are routed through the retaining clips or cable clamps, as applicable.

6.6 Connecting to the MC Network or the S/5 Network

WARNING **MISSED ALARMS - Do not use with iCentral software with Versions 5.0.3 and earlier or with Mobile Care Server with Version 5.2 and earlier.**

WARNING **INCORRECT CALCULATIONS - Using the System with the Aware Gateway software version 1.4 or earlier could result in incorrect patient height and weight information. This could lead to incorrect drug dose calculations, hemodynamic calculations, or oxygenation calculations. Prior to installing the System, please contact the GE Healthcare Aware Gateway HL7 Integration Engineering Team or your GE Healthcare service representative to verify or update your Aware Gateway configuration.**

WARNING **EXCESSIVE LEAKAGE CURRENT - Only devices that are specified compliant with IEC 60950-1 or IEC 60601-1 may be connected to the Ethernet MC or IX ports.**

The patient monitor can be connected either to the wired MC Network or S/5 Network.

- Connect the MC Network or the S/5 Network patch cable to the network connector labelled as “MC” in the rear panel of the patient monitor.

6.7 Connecting to the IX Network

- Connect the IX Network patch cable to the network connector labelled as “IX” in the rear panel of the patient monitor.

6.8 Connecting to a Unity Network ID connectivity device

Ensure that the Unity Network ID connectivity device is properly mounted, installed and configured prior to connecting it to the patient monitor.

CAUTION INSTALLATION - To avoid accidental ingress of liquids, always mount the Unity Network Interface Device (ID) in a vertical position with the connectors at the bottom.

- Connect a Unity Network ID connectivity device to the network connector labelled “ID” in the rear panel of the patient monitor.

WARNING **Before connecting an interfacing module to the device, verify compatibility. Verify the connectivity of device interfaces before using the equipment. Verify the compatibility of software versions before using the equipment.**

CAUTION The use of the wrong interface adapter may cause improper operation of the supported peripheral device.

WARNING **SINGLE PATIENT USE - All eight serial ports of the Unity Network Interface Device (ID) must only be used on one patient.**

6.9 Connecting USB devices

NOTE: The USB- connection to a D15K or D19KT secondary display reserves one of the USB connectors in the rear panel of the patient monitor.

Connect the following devices to the USB ports in the rear panel of the patient monitor or at the bottom of a D15K or D19KT display:

- Alphanumeric keyboard
- Mouse
- Remote control
- Barcode reader

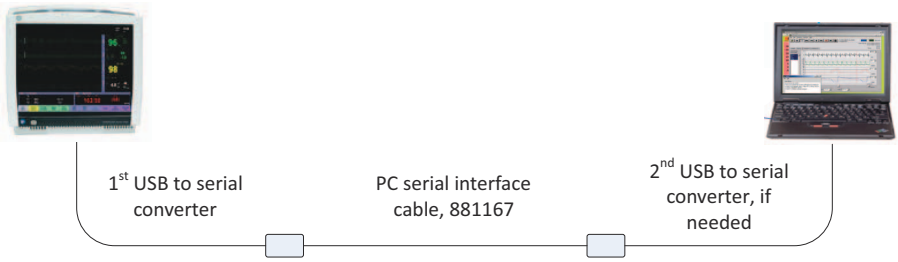
NOTE: Always use a GE-supplied barcode reader for the CARESCAPE monitors. The barcode reader comes pre-configured and is ready to connect. Refer to the included installation instructions for more details.

WARNING **Use only washable keyboard with at least IPX1 protection against ingress of water.**

6.10 Connecting iCollect and other data acquisition systems

iCollect and other data acquisition systems can be connected to one of the USB connectors in the rear panel of the patient monitor.

NOTE: Use the ATEN UC232A USB-to-serial Converter and PC serial interface cable to connect iCollect and the other data acquisition systems to the patient monitor.



NOTE: Refer to the iCollect User's Manual for more information about the iCollect.

NOTE: Contact GE Healthcare Service to get more information about interfacing other data acquisition systems to the patient monitor.

6.11 Connecting a remote-on cable

Remote-on connection allows you to power-up the patient monitor from the power switch of a GE Healthcare anesthesia machine.

1. Connect the remote-on cable to the remote-on connector in the rear panel of the patient monitor.
2. Connect the other end of the remote-on cable to the related connector in the anesthesia machine. Refer to the related product documentation for details.

NOTE: Remote-on connection is possible only if the anesthesia machine supports this feature.

NOTE: The remote on/standby function is disabled when the patient monitor is battery powered.

6.12 Connecting a local printer to the IX connector

You can connect a local laser printer directly to the patient monitor's IX connector with a crossover cable.

1. Connect the Ethernet cable to the IX connector labelled as "IX" in the rear panel of the patient monitor.
2. Connect the other end of the Ethernet crossover cable to the connector in the laser printer.

NOTE: If the local printer is used within the patient environment it must always be powered from an additional transformer providing at least basic isolation.

NOTE: Refer to the printer manual on how to install and configure the printer. The printer shall be configured to communicate in the same subnet with the patient monitor's IX Network settings.

WARNING **EXCESSIVE LEAKAGE CURRENT - Laser printers are UL 60950/IEC 60950 certified equipment, which may not meet the leakage current requirements of patient care equipment. This equipment must not be located in the patient environment unless the medical system standard IEC 60601-1-1 is followed. Do not connect a laser printer to a multiple socket outlet supplying patient care equipment. The use of multiple socket outlet for a system will result in an enclosure leakage current equal to the sum of all the**

individual earth leakage currents of the system if there is an interruption of the multiple socket outlet protective earth conductor.

WARNING Non-medical equipment does not provide the same level of protection against electrical shock. Do not touch the patient and any part of non-medical equipment at the same time. Some examples of non-medical equipment are laser printers and non-medical computers.

7 Configuration

The configuration of the patient monitor consists of platform configuration and clinical configuration.

This chapter describes how to perform the platform configuration tasks needed to take the patient monitor into use for the first time and the configuration tasks needed for administration and maintenance thereafter.

For information on how to perform the clinical configuration, including care unit settings and user profiles, refer to the patient monitor's user's manual.

7.1 Adjusting display

7.1.1 Adjusting the brightness of the integrated primary display

If needed, adjust the display brightness from the ***Monitor Setup > Brightness*** menu. Refer to the patient monitor's user's manual for more information.

7.1.2 Calibrating a touchscreen

NOTE: The touchscreen function of the integrated primary screen has been calibrated in the factory. Re-calibration is typically needed only after replacing the uDOM or the touchscreen sensor.

Calibrate the connected touchscreens, one by one, as follows:

1. Select ***Monitor Setup > Service Calibrations.***
2. In the ***Enter Password*** dialog box, type the username and password and press **Enter**.

   Username: **biomed**

   Password: **Change**<space>**Me**

NOTE: Username and password are case sensitive.

NOTE: The factory default password for the username "biomed" is "Change Me".

3. In the ***Service / Calibrations*** menu, select ***Touch Screen*** to calibrate the integrated primary display or ***External Touch Screen*** to calibrate the connected secondary display.
4. The Touch calibration screen opens.
5. Touch the calibration mark or cross hair (+) in each corner of the screen, according to the instructions shown on the screen.

7.1.3 Adjusting optional secondary display

If needed, adjust the picture on the display using the Auto Adjustment feature in the display's OSD menu. Refer to the display's user manual for details.

7.2 Configuring the network

7.2.1 Configuring hostname

1. Log in to Webmin
2. Select ***Configuration > Network > Hostname.***
   The ***Hostname Configuration*** window opens.
   The current hostname is shown in the ***Current Value*** column.

3. Enter the new hostname in the ***Change Value to*** column.

   NOTE: The hostname is a unique, 4 to 32 character long identifier of a patient monitor in the network. Use alphanumeric characters A-Z, a-z, 0-9. The hostname may include also characters "-" and "_", but it can't start or end with these characters.

4. Select ***Save***.
   The hostname configuration will take effect immediately.

7.2.2 Selecting and configuring CARESCAPE Network

To select CARESCAPE Network MC for the real-time network infrastructure:

1. Log in to Webmin.
2. Select ***Configuration > Network > Wired Interfaces***.
   The current network configuration is shown in the ***Present Configuration*** table.
3. Below ***Select Network Type*** in the ***Network Configuration*** window, select the applicable network type: ***CARESCAPE Network***.
4. Select ***Next*** to proceed on network configuration.

NOTE: When ***CARESCAPE Network*** is selected, the S/5 Network is disabled.

The patient monitor may be configured to the MC Network, or IX Network, or both.

Network connection(s)	Steps to be performed
MC Network only	5, (6) and 9
IX Network only	7, 8 and 9
Both MC and IX Network	5, (6), 7, 8 and 9

NOTE: The following IP addresses are reserved and not valid: 172.16.254.254, 172.16.255.255, 172.18.254.254, 172.18.255.255, 192.168.250.x, 192.168.252.x, 192.168.253.x, 192.168.254.1 and 192.168.254.2.

5. In the ***Network Configuration*** window below ***MC Network.***
   a. Enter a ***Static IP*** address.
   b. Enter a valid ***Netmask*** level.
   c. Select the applicable ***Speed & Duplex*** option.
6. If separate MC Network segments are connected together by a router, configure the router information below the MC static route:
   a. Enter ***Destination Address***.
   b. Enter ***Destination Netmask***.
   c. Enter an ***MC Gateway.***
7. Below ***IX Network,*** select ***DHCP*** or ***Manual Configuration***.
   If ***Manual Configuration*** is selected, enter the following information in the entry fields:
   a. Enter a ***Static IP*** address.
   b. Enter a valid ***Netmask*** level.
   c. Enter a valid ***Default Gateway***.
   d. Enter valid ***DNS Server*** addresses if applicable.
8. Select the applicable ***Speed & Duplex*** option.
9. Select ***Save***.

The network configurations will be saved and become active when the patient monitor is restarted.

7.2.3 Selecting and configuring S/5 Network

To select S/5 Network for the real-time network infrastructure:

1. Log in to Webmin.
2. Select ***Configuration > Network > Wired Interfaces***.
   The current network configuration is shown in the ***Present Configuration*** table.
3. Below ***Select Network Type*** in the ***Network Configuration*** window, select the applicable network type: ***S/5***.
4. Select ***Next*** to proceed on network configuration.

NOTE: When ***S/5*** Network is selected, the CARESCAPE Network is disabled.

The patient monitor may be configured to the S/5 Network, or IX Network, or both.

Network connection(s)	Steps to be performed
S/5 Network only	1 and 4
IX Network only	2, 3 and 4
Both S/5 and IX Network	1, 2, 3 and 4

1. In the ***Network Configuration*** window below ***S/5 Network***, enter a ***Virtual ID.***

NOTE: Valid values are within the range of 50000 to 55000, inclusive.

NOTE: The Virtual ID must be unique for each patient monitor connected to the S/5 Network.

2. Below ***IX Network***, select ***DHCP*** or ***Manual Configuration***.
   a. Enter a ***Static IP*** address.
   b. Enter a valid ***Netmask*** level.
   c. Enter a valid ***Default Gateway***.
   d. Enter valid ***DNS Server*** addresses if applicable.
3. Select the applicable ***Speed*** & ***Duplex*** option.
4. Select ***Save***.

The S/5 virtual ID change will be applied immediately. All other network configurations will be saved and become active after the patient monitor is restarted.

7.2.4 Configuring WLAN

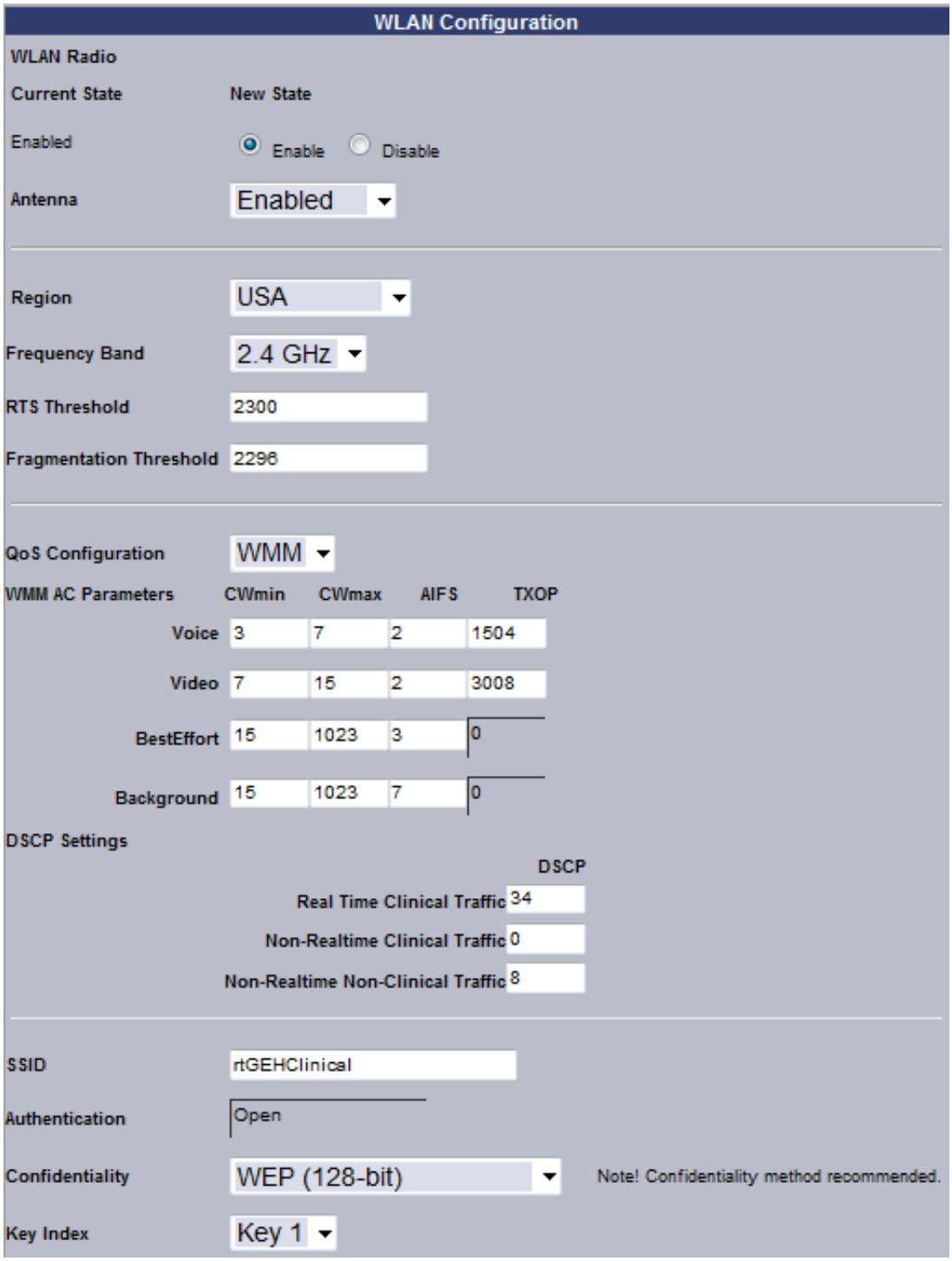
NOTE: The network infrastructure selection, MC Network or S/5 Network, and related configuration shall be completed prior to configuring the WLAN settings.

NOTE: Wireless communication is supported only in CARESCAPE Network MC and S/5 Network. CARESCAPE Network IX does not support wireless communication.

1. Log in to Webmin.
2. Select ***Configuration*** > ***WLAN***. The current status of the WLAN radio is shown below the ***Current State*** in the ***WLAN Configuration*** window.
3. Select ***Enable*** as a ***New State*** to enable the WLAN radio.
4. Select ***Antenna*** as ***Enabled*** to enable both the internal antennas.

NOTE: Antenna diversity is a method used to assist in compensating for multipath interference. When set to Enabled, Antenna Diversity monitors the signal from each antenna and automatically switches to the one with the better signal.

5. Configure the appropriate WLAN settings. Note that the configurable attributes and available values are different for MC Network and S/5 Network.



WLAN Client Configuration		
Item	**Description**	**Comments**
Region	Select the WLAN region mode from one of the following options: - USA - Europe - Japan - World Mode	The region setting is used to set the maximum transmit power and allowed channels for the WLAN radio card. If your country or region is not listed, select World Mode. World mode is a partial implementation of the 802.11d standard, and using it requires the access points to be configured accordingly. Failure to receive 802.11d regulatory information from access point disables the wireless networking feature.
Frequency Band	Select the frequency band to be used with the WLAN radio: - 2.4 GHzPass - 5.1 GHz - All Band (2.4 GHz & 5.1 GHz)	The WLAN radio is capable to communicate on the following frequency bands, protocols and data rates: - 2.4 GHz, IEEE 802.11b, up to 11 Mbps. - 2.4 GHz, IEEE 802.11g, up to 54 Mbps. - 5.1 GHz, IEEE 802.11a, up to 54 Mbps. NOTE: In the S/5 Wireless Network, the frequency band is fixed to 2.4 GHz and it supports 802.11b protocol only.
RTS Threshold	Configure the RTS Threshold value.	Use the default RTS Threshold value, unless otherwise specified in the wireless network design. A valid RTS Threshold is a numeric value within the range of 64 to 2300. NOTE: This option is not configurable in the S/5 Wireless Network.
Fragmentation Threshold	Configure the Fragmentation Threshold value.	Fragmentation Threshold specifies the maximum frame size a wireless device can transmit without fragmenting the frame. A valid Fragmentation Threshold is a numeric value within the range of 64 to 2300. Use the default Fragmentation Threshold value, unless otherwise specified in the wireless network design. NOTE: This option is not configurable in the S/5 Wireless Network.
QoS Configuration	Select the Quality of Service (QoS) standard used in the wireless infrastructure to prioritize the network traffic: - None (no QoS in use) - WMM (WLAN Multimedia in use)	Select QoS configuration setting as specified in the wireless network design. NOTE: This option is not configurable in S/5 Wireless Network.

WLAN Client Configuration		
Item	**Description**	**Comments**
WMM AC Parameters	Configure the WMM AC Parameters (CWmin, CWmax, AIFS, TXOP) for each access category (voice, video, best effort and background) if the QoS Configuration was selected as WMM.	WLAN Multimedia (WMM) provide basic Quality of Service (QoS) features to IEEE802.11 networks by prioritizing wireless network traffic according to four Access Categories (AC) – voice, video, best effort and background. Use the default WMM AC parameter values, unless otherwise specified in the wireless network design. Valid values: - CWmin: 3-1023 - CWmax: 7-1023 - AIFS: 0-20 - TXOP: 0-65536 (0 for Best Effort and Background) NOTE: The WMM AC parameters are configurable only if the QoS Selection was selected as WMM. NOTE: The DSCP settings are configurable only if the QoS Selection was selected as WMM. NOTE: This option is not configurable in S/5 Wireless Network.
Wireless DSCP Settings	Configure the DSCP settings for the following network traffic: - Real Time Clinical Traffic - Non-Real time Clinical Traffic - Non-Real-time Non-Clinical Traffic	Valid DSCP ranges: Real Time Clinical Data (Waveforms, Parameters, etc.) 32 - 47 Non-Real time Clinical Data (Trends, Full Disclosure, Printing, etc.) 0 - 7 Non-Real-time Non-Clinical Data (InSite, Service traffic, etc.) 8 - 23 DSCP (Differentiated Services Code Point) settings provide Quality of Service (QoS) features by prioritizing network traffic by traffic type. It uses traffic classification by placing each data packet into a limited number of traffic classes. Use the default DSCP values, unless otherwise specified in the wireless network design. Note: For Non Real-Time Clinical Data traffic on wireless, do not use DSCP values of 24-31. A risk exists that Real-Time Clinical Data and Non Real-Time Clinical Data will arrive at the same QoS value in the wired network if proper DSCP to DSCP mapping is not done at the wired to wireless interface. NOTE: This option is not configurable in the S/5 Wireless Network.

WLAN Client Configuration		
Item	**Description**	**Comments**
SSID	Enter the Service Set Identifier (SSID), also known as network name.	The SSID of the wireless client must match the SSID of the wireless infrastructure. A valid SSID includes up to 32 case-sensitive ASCII characters, including space (ASCII decimal 32 to 126).
Confidentiality	Select the Confidentiality (Data Privacy) method to be used: - None - WEP (64-bit) - WEP (128-bit) - WPA-PSK (TKIP) - WPA2-PSK (AES-CCMP)	The confidentiality method of the wireless client must match the confidentiality method of the wireless infrastructure. NOTE: The authentication method used with WEP is Open System Authentication. NOTE: The wireless MC Network supports only confidentiality methods “None”, “WEP (128-bit)”, "WPA-PSK (TKIP)" and "WPA2-PSK (AES-CCMP)" NOTE: The S/5 Wireless Network supports only confidentiality methods “None”, "WEP (64-bit) and “WEP (128-bit)”.
Key Index	Select the Key Index to be used.	The Key Index of the wireless client must match the Key Index of the wireless infrastructure. NOTE: The Key Index is selectable only if the confidentiality method selected is “WEP (64-bit)” or “WEP (128 bit)”.
Pass Phrase / Key Format	Select the Pass Phrase / Key Format: - ASCII - HEX	Select the format of entering a Pass Phrase / Key Format.

WLAN Client Configuration		
Item	**Description**	**Comments**
Pass Phrase / Key	Enter the Pass Phrase / Key for the used confidentiality method as an ASCII or HEX string as selected above: WEP (64-bit) / WEP (128-bit): - Enter a 5/13 character long ASCII string. The system will generate a 10/26 character hexadecimal security key and assign it to the currently selected Key Index. OR - Enter a 10/26 character long hexadecimal (HEX) string. This security key will be assigned for the currently selected Key Index. WPA-PSK (TKIP) and WPA2-PSK (AES-CCMP) - Enter a 8 to 63 character long (ASCII) string OR - Enter a 64 character long hexadecimal (HEX) string	The Pass Phrase / Key of the wireless client must match the Pass Phrase / Key of the wireless infrastructure. A valid ASCII Pass Phrase / Key includes only printable ASCII characters, that is space and ASCII decimals 32 to 126. However the following three ASCII decimals are not valid: 34 ("), 39 ('), and 96 (`). A valid HEX Pass Phrase / Key may include numeric characters 0-9 and alpha characters A-F. NOTE: A Pass Phrase / Key will be displayed as 10 successive asterisk (*) characters, after it has been saved.
Confirm Pass Phrase / Key	Re-enter the Pass Phrase / Key entered above.	

6. Select ***Save*** to confirm the selections above.

If the WLAN Radio status is changed, all the WLAN configuration changes take effect on the next monitor restart. If the WLAN Radio status is not changed, all the WLAN configuration changes will take effect immediately.

7.3 Setting time and date

NOTE: In the S/5 Network, the patient monitor's date and time is automatically synchronized with the date and time of the iCentral it is connected to. You can set the date and time locally only if the patient monitor is not connected to the S/5 Network and the patient monitor is in a discharged state.

CAUTION NETWORK DEVICE TIME SYNCHRONIZATION — When adding a new device to the CARESCAPE Network, the existing devices on the CARESCAPE Network will synchronize to the new device's time. To prevent potential time synchronization issues, you should set the new device's time to be as close as possible to the time (within one minute or less) used by the existing GE devices on the CARESCAPE Network.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Time***.

3. In the ***Time Configuration*** window, in ***Configure Date and Time***, update the following fields as needed:
   - Date
   - Month
   - Year
   - Hour:Minute
   - AM/PM
   - 12/24 Hrs
4. In the ***Time Configuration*** window, in ***Configure Time Zone***, select the appropriate ***UTC Offset***, if applicable.

   NOTE: The time zone configuration only applies to communication with Citrix server.
5. Select ***Save***.

The manual time configuration takes effect immediately.

7.4 Setting unit and bed name

Configure the care unit name and bed name for patient monitors that are configured to connect to the MC Network.

NOTE: The unit name shall be set the same with all the patient monitors and CARESCAPE CIC Pro central stations that are connected to the same care unit in the MC Network. Bed name shall be unique to each patient monitor in the same care unit.

NOTE: Unit and bed name selections are not available if network selection is S/5.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Unit and Bed Name***.
3. In the ***Unit and Bed Name Configuration*** window, view or set the unit name and bed name for the device.

NOTE: Use only capital letters A - Z, numbers, dash (-), asterisk (*) and space ( ). The unit name may be up to seven characters long and bed name up to five characters long.

4. Select ***Save***.

The unit and bed name configuration takes effect immediately.

7.5 Configuring printers

You can configure the patient monitor to print to up to 12 laser printers connected on the IX Network. Use the Webmin sub-modules to install or delete a printer and to print a test page.

NOTE: Ensure that you have the host name(s) or IP address(es) for all the connected IX printers available. Configure the IX printers according to this information.

NOTE: Laser printers that are installed on central stations do not need to be configured using Webmin. Refer to the user's manual for details on configuring the printer.

NOTE: Refer to the CARESCAPE Modular Monitors Supplemental Information Manual for the list of supported devices.

7.5.1 Installing a printer

1. Log in to Webmin.
2. Select ***Configuration*** > ***Printers***.

3. In the ***Sub-Modules for Printers*** menu, select ***Install Printer***.
4. Below ***Printer Configuration Information*** in the ***Install Printer*** window, provide the following information:
   a. Select either the ***Hostname*** or ***IP Address*** radio button, as applicable.
   b. In the ***Hostname*** or ***IP Address*** field, enter the printer ***Hostname*** or ***IP Address***.
   c. In the ***Printer Name*** field, enter the ***Printer Name***.
   d. Select ***Yes*** from the drop down list next to ***Test Page***.
5. Select ***Save***.
6. From the patient monitor, select ***Monitor Setup*** > ***Printing***.
7. Select the ***Devices*** > ***Setup***.
8. In the ***Printout*** menu, select what to print out (for example, ***Waveforms***, ***Alarm Waveforms***, ***Numeric Trends***, ***Reports***).
9. Below ***Location***, select the radio button next to ***Network***.
10. From the drop down list next to ***Network Device***, select the desired printer.

The change will take effect immediately.

7.5.2 Deleting a printer

NOTE: Before deleting a laser printer, check ***Monitor Setup > Printing > Devices > Status.*** If a printout is assigned to the printer to be deleted, redirect the printout to another valid printer.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Printers***.
3. In the ***Sub-Modules for Printers*** menu, select ***Delete Printer***.
4. In the ***Delete Printer*** window, select the printer to delete.
5. Select ***Save***.

The change will take effect immediately.

7.5.3 Printing a test page

1. Log in to Webmin.
2. Select ***Configuration*** > ***Printers***.
3. In the ***Sub-Modules for Printers*** menu, select ***Print Test Page***.
4. In the ***Print Test Page*** window, select the printer.
5. Select ***Save***.

7.6 Configuring Citrix

Configure the Citrix connection for iPanel software.

NOTE: GE is not responsible for installing or configuring the Citrix server.

NOTE: Contact hospital's IT Administrator or biomedical department to obtain values to the following fields.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Citrix***.
3. In the ***Citrix Configuration*** window, enter the applicable information in the following fields:

Field name	Description and valid choices
Server Address	Blank, server IP address or server hostname, up to 255 character long
Initial Program	Initial Citrix- published application that will be launched, for example #MUSE. This field is mandatory, if the server address has been entered. The maximum length is 128 characters.
Citrix Session Timeout (in Minutes)	Valid values are between 0-99. Keeping the session alive allows users to quickly return to their last session, but locks a Citrix license. Selecting "0" disables the timeout feature.
Username	Any valid Windows username. You can leave this field empty to allow anonymous login. The maximum length is 128 characters.
Password	Any valid Windows password. You can leave this field empty to allow anonymous login. The maximum length is 128 characters.
Confirm Password	The password and confirmed password must be the same.
Encryption Level	Select one of the following encryption levels: - "Basic" - "RC5 (128 bit - Login Only)" - "RC5 (40 bit)" - "RC5 (56 bit)" - "RC5 (128 bit)"

4. Select ***Save***.

7.7 Configuring MUSE/12SL

NOTE: MUSE viewing is a licensed software feature. You can configure the MUSE/12SL settings independent of the license status, but actual viewing of MUSE reports requires that the MuseView license is enabled.

Settings to send 12SL data

1. Log in to Webmin.
2. Select ***Configuration*** > ***MUSE/12SL***.
3. In the ***MUSE/12SL*** window, enter the applicable information in the following fields:

   - ***Location ID*** Identifies the location ID number (within the range 0 to 599) associated with the patient monitor for searching the MUSE system.
   - ***Site Number*** Identifies the site number (within the range 1 to 254) associated with the patient monitor for searching the MUSE system.

4. Select ***Save***.

These settings take effect immediately after they are submitted.

Settings to view 12SL data

1. Log in to Webmin.
2. Select ***Configuration*** > ***MUSE/12SL***.
3. In the ***MUSE/12SL*** window, enter the following:

- ***MUSE Web Username*** — Username used to authenticate with the MUSE Web to access 12-lead reports.
- ***MUSE Web Password*** — Password used to authenticate with the MUSE Web to access 12-lead reports.
- ***Confirm Password*** — The password and the confirmed password must be the same.
- ***MUSE Web URL*** — Used to locate the MUSE Web system to access 12-lead reports. Enter the URL in a valid format.

4. Select ***Save***.

These settings take effect immediately after they are submitted.

7.8 Admit settings

7.8.1 Patient ID prefix

The patient monitor will automatically generate a temporary, unique patient ID when a patient with unknown ID is admitted to the patient monitor. The patient monitor will use this temporary patient ID for all 12SL reports that are sent to MUSE until the patient is discharged from the patient monitor, or his/her patient ID is changed. The temporary patient ID is generated from the temporary patient ID prefix, care unit name, bed name, and current time.

The temporary patient ID prefix is a hospital defined prefix that is used as the first two characters in a temporary patient ID to ensure its uniqueness inside the hospital.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Admit Settings***.
3. In the ***Sub-Modules for Admit Settings*** menu, select ***Patient ID Prefix***.
4. In the ***Patient ID Prefix*** window, enter a 2-character prefix.

NOTE: Valid values are uppercase letters and numbers.

5. Select ***Save***.

All changes take effect immediately.

7.8.2 Barcode settings

Barcode settings must be configured if a barcode reader is used to input patient data to the Admit/Discharge menu.

NOTE: Acquire detailed specification of the character-delimited or the length-delimited, multi-field barcode that the hospital uses. This will configure the barcode parser correctly.

NOTE: Acquire sample barcodes, if possible, to verify the operation of the parser configuration.

NOTE: For details on barcode data requirements and restrictions, see section 7.8.5 Barcode data specifications.

1. Select the parser type.
   a. Log in to Webmin.
   b. Select ***Configuration*** > ***Admit Settings***.
   c. In the ***Sub-Modules for Admit Settings*** window, select ***Barcode Settings***.
   d. Below ***Barcode Setup*** in the ***Barcode Settings*** window, select the applicable parser type from the drop-down list:.

Parser type	Used with this type of barcode
No Parser	Simple barcode that contains one piece of information, but no data control, so there is no need for a parser.
Length Delimited Parser	Barcode that specifies the beginning position and length of each field on the barcode.
Character Delimited Parser	Barcode that specifies a special character that separates each field on the barcode.

2. Select ***Save***.

   If you selected ***No Parser***, the barcode setting configuration is complete.

   For a ***Length*** or ***Character Delimited Parser***, follow the applicable instructions.

   – 7.8.3 Configuring Length Delimited Parser information.
   or
   – 7.8.4 Configure character delimited parser information.

7.8.3 Configuring Length Delimited Parser information

Points to note

– If you configure ***Age***, you must either select the ***Age Unit*** item or one of the age units (e.g., Years, Months, Weeks, Days) below ***Fixed Option***.
– If you configure ***Height***, you must either select the ***Height Unit*** item or one of the height units (e.g., Feet, Inches, Meters, Centimeters, Millimeters) below ***Fixed Option***.
– If you configure ***Weight***, you must either select the ***Weight Unit*** item or one of the weight units (e.g., Kilograms, Grams, Micrograms, Pounds, Ounces) below ***Fixed Option***.
– For an example of admit/discharge configuration for a length delimited parser, see Example of Length Delimited Parser information on page 78.

1. In the ***Admit/Discharge Configuration*** window, enter the location and length information for each data item.

   If an item is not included in the barcode, type 0 in the item's ***Position*** and ***Length*** fields, or leave the ***Position*** and ***Length*** fields blank.

   a. In the ***Position*** column, type the beginning position of the field in the data string (from 1 to 300).
   b. In the ***Length*** column, type the number of characters (from 1 to 99) that the field contains.

2. For ***Gender Format***, select ***Fixed*** or ***Configured***.

   If you select ***Configured***:

   a. Type the character that identifies ***Male***.
   b. Type the character that identifies ***Female***.

3. Below ***Fixed Option***, select the applicable value:

Item	Item selection in the top part of the screen	Fixed Option selection
Height Unit	Both ***Height*** and ***Height Unit***	*Non-Fixed*.
	Height only	Select value from drop down list.
Weight Unit	Both ***Weight*** and ***Weight Unit***	***Non-Fixed***.
	Weight only	Select value from drop down list.
Age Unit	Both ***Age*** and ***Age Unit***	***Non-Fixed***.
	Age only	Select value from drop down list.

4. Scroll to the bottom of the window, and select ***Save***.

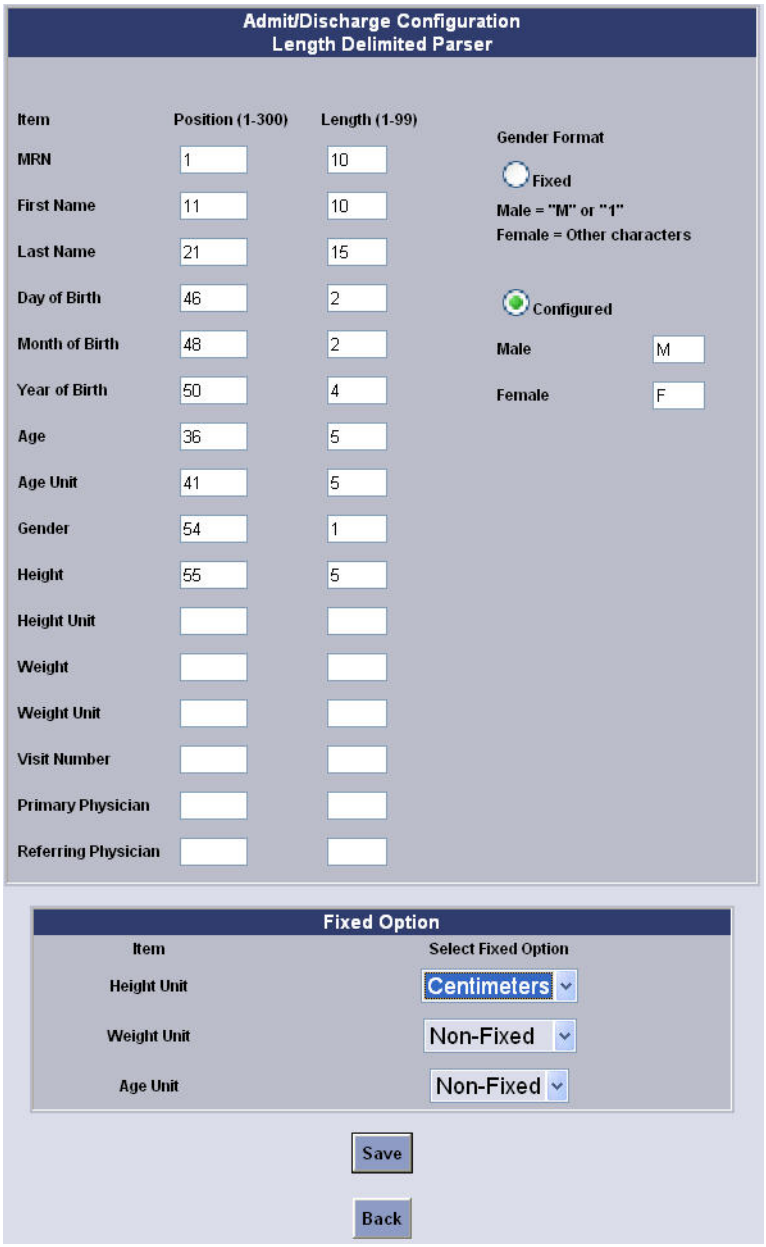
All changes take effect immediately.

Example of Length Delimited Parser information

In this example, the barcode contains 10 items. The following table lists the starting position and length of each item.

Item	Starting Position	Length
MRN	1	10
First Name	11	10
Last Name	21	15
Day of Birth	46	2
Month of Birth	48	2
Year of Birth	50	4
Age	36	5
Age Unit	41	5
Gender	54	1
Height	55	5

The following sample shows the corresponding entries in the ***Admit/Discharge Configuration*** window.



7.8.4 Configure character delimited parser information

Points to note

- If you configure ***Age***, you must either select the ***Age Unit*** item or one of the age units (e.g., Years, Months, Weeks, Days) below ***Fixed Option***.
- If you configure ***Height***, you must either select the ***Height Unit*** item or one of the height units (e.g., Feet, Inches, Meters, Centimeters, Millimeters) below ***Fixed Option***.
- If you configure ***Weight***, you must either select the ***Weight Unit*** item or one of the weight units (e.g., Kilograms, Grams, Micrograms, Pounds, Ounces) below ***Fixed Option***.
- For an example of admit/discharge configuration for a length delimited parser, see Example of character delimited parser information entry on page 80.

1. In the ***Position*** column of the ***Admit/Discharge Configuration*** window, enter the sequence number of each item included in the barcode. Use incremental numbers from 1 (the left-most field) up to 16 (the right-most field).

   If an item is not included in the barcode, leave the ***Position*** field blank for the item.

2. Below ***Field Delimiter***, in the ***Delimiter*** field, enter the special character that separates the fields on the barcode.

NOTE: Allowed characters are ASCII characters 33-126.

NOTE: Forbidden characters are control characters (ASCII characters 0-31), the space character (ASCII character 32), and ASCII characters 127 and above.

NOTE: If the character selected exists in any field in the barcode, it will be misinterpreted as a field delimiter.

3. Below ***Gender Code***, enter the codes that identify ***Male*** and ***Female***.
4. Below ***Fixed Option***, select the applicable value:

Item	Item selection in the top part of the screen	Fixed Option selection
Height Unit	Both ***Height*** and ***Height Unit***	*Non-Fixed*.
	Height only	Select value from drop down list.
Weight Unit	Both ***Weight*** and ***Weight Unit***	***Non-Fixed***.
	Weight only	Select value from drop down list.
Age Unit	Both ***Age*** and ***Age Unit***	***Non-Fixed***.
	Age only	Select value from drop down list.

5. Scroll to the bottom of the window, and select ***Save***.

All changes take effect immediately.

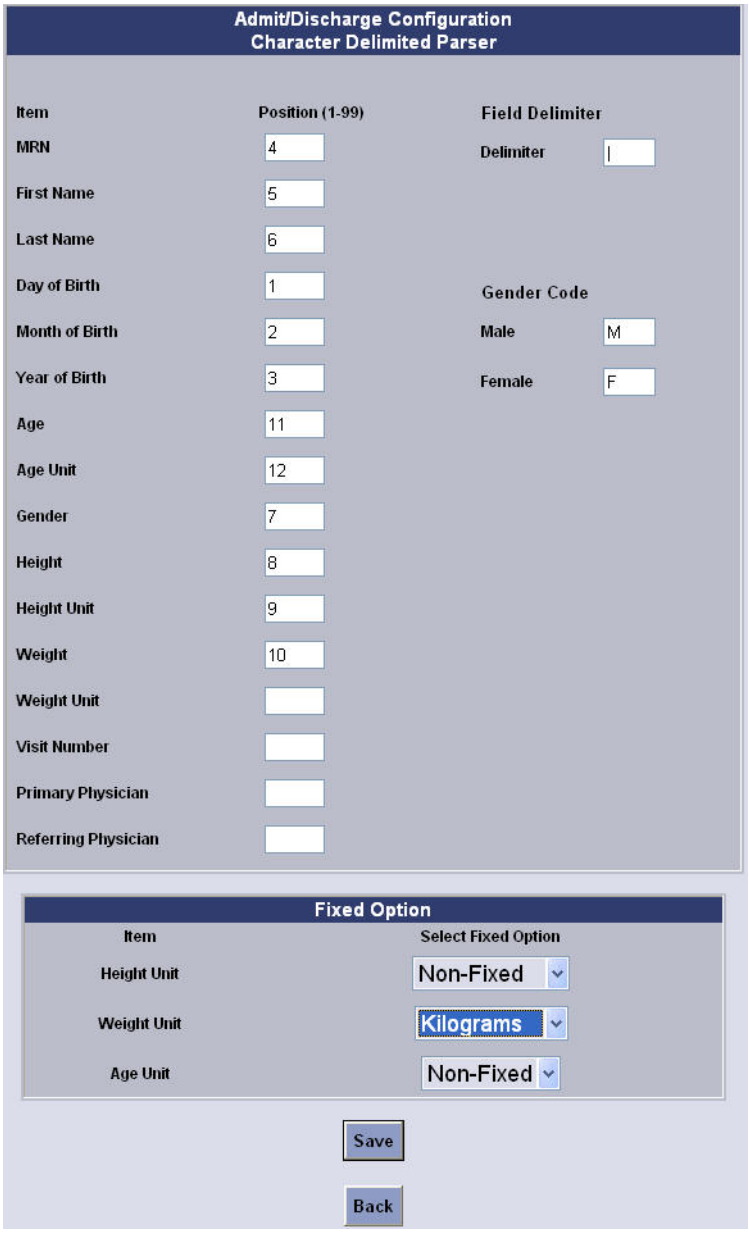
Example of character delimited parser information entry

In the following example, the barcode contains 12 items and uses the pound sign (#) as a delimiter.

Item	Sequence number of the item in the barcode
MRN	4
First Name	5
Last Name	6
Day of Birth	1
Month of Birth	2
Year of Birth	3
Age	11
Age Unit	12
Gender	7

Item	Sequence number of the item in the barcode
Height	8
Height Unit	9
Weight	10

The following sample shows the corresponding entries in the ***Admit/Discharge Configuration*** window.



7.8.5 Barcode data specifications

Points to note

– The maximum length of the entire barcode is 300.

– If the field value is longer than the maximum length indicated, the right-most characters will be truncated when the value is displayed in the ***Admit/Discharge*** menu.

If a field contains a forbidden character, that character will be replaced with a space when it is displayed in the ***Admit/Discharge*** menu.

Item	Maximum length	Valid entries	Comments
MRN	99	Both letters and numbers	Forbidden characters are those that are not allowed by the patient monitor, including the following characters: ! " # ¤ % & /( ) = ? ` @ £ $ € { [ ] } \ * ^ _ : ; | < >
First Name	99		
Last Name	99		
Day of Birth	2	1-31	If Day of Birth is present in the barcode, then Month of Birth and Year of Birth also need to be present.
Month of Birth	2	1-12	If Month of Birth is present in the barcode, then Day of Birth and Year of Birth also need to be present.
Year of Birth	4	1880 to current year	If Year of Birth is present in the barcode, then Day of Birth and Month of Birth also need to be present.
Age	99	Numeric 9999.9999	Either a period or comma is accepted as a decimal symbol.
Age Unit	99	A, Y, YR, YRS (years) MO, MOS (months) WK, WKS (weeks) D, DAY, DYS (days)	
Gender	1		If gender is configured (not fixed), this must be 1 character.
Height	99	Numeric 9999.9999	Either a period or comma is accepted as a decimal symbol.
Height Unit	99	FT (feet) IN (inches) M (meters) CM (centimeters) MM (millimeters)	
Weight	99	Numeric 9999.9999	Either a period or comma is accepted as a decimal symbol.
Weight Unit	99	KG, KGS (kilograms) G, GM, GMS (grams) MCG (micrograms) OZ, OZS (ounces) LB, LBS (pounds)	
Visit Number	99	Both letters and numbers	Forbidden characters are those that are not allowed by the patient monitor, including the following characters: ! " # ¤ % & /( ) = ? ` @ £ $ € { [ ] } \ * ^ _ : ; | < >
Primary Physician	99		
Referring Physician	99		

7.9 Setting power frequency

WARNING **Incorrect power line frequency setting could adversely affect ECG and EEG processing.**

1. Log in to Webmin.
2. Select ***Configuration*** > ***Power Frequency***.
3. In the ***Power Frequency*** window, select the applicable power line frequency.
4. Select ***Save***.

The power frequency configuration takes effect immediately.

7.10 Selecting language and locale

Select the language used in clinical user interface and select the keyboard locale setting for the alphanumeric keyboard and the barcode reader.

1. Log in to Webmin.
2. Select ***Configuration*** >***Language***.
3. In the ***Language*** window, select the patient monitor language and keyboard language:
   a. Select the patient monitor language from the drop-down list and select ***Save***.
   b. Select the keyboard locale from the drop-down list and select ***Save***.

The language takes effect after the patient monitor is restarted. The keyboard locale takes effect immediately after it is submitted.

7.11 Selecting national requirements

Activate France specific defaults for the ECG HR adjustment range and the reminder beep behavior.

1. Log in to Webmin.
2. Select ***Configuration*** > ***National Requirements***.
3. In the ***National Requirement*** window, select the applicable option:

Value	Description
None	Select the normal defaults.
France	Enable the following country specific monitoring: - Heart Rate high alarm limit maximum 230. - Reminder beep will sound every 2 minutes when alarms have been silenced permanently.

4. Select ***Save***.

The national requirements changes take effect immediately.

7.12 Configuring modules

You can configure some acquisition module specific settings. The settings are saved to the permanent memory of the related acquisition module and the settings travel with the module from one patient monitor to another.

These settings are pre-configured at factory, except the ***Assets Settings***. You may need to re-configure them after corrective maintenance, or for administration purposes.

Refer to the Module Frames and Modules Technical Manual for detailed information on how to change these settings.

Webmin sub-module	Module	Description
Assets Settings	PDM	This setting allows you to view the customer assigned asset number of the PDM.
Licensing	PDM	This setting allows you to manage the PDM feature licenses.
ECG Filter Configuration	PDM	This setting allows you to temporarily disable the ECG filter of the PDM.
STP/TP/ST Settings	E-PSM & E-PSMP	This setting allows you configure the STP/TP/ST setting after replacing the STP board.
P/PT/PP Settings	E-P, E-PT & E-PP	This setting allows you to configure the P/PT/PP setting after replacing the STP board.

7.12.1 Module asset settings

NOTE: This configuration applies only to the PDM.

NOTE: The ***Device Serial Number*** field is view only and cannot be changed.

To set the device asset number of a PDM:

1. Log in to Webmin.
2. Select ***Configuration*** > ***Modules***.
3. In the ***Sub-Modules for Modules*** menu, select ***Assets Settings***.
4. In the ***Assets Settings*** window, enter the user-assigned asset number for the device in the ***Change Value to*** column.
5. Select ***Save***.

The change will take effect immediately.

7.13 Setting the host asset number

Enter a host asset number and view the host serial number.

NOTE: The ***Host Serial Number*** field is view only and cannot be changed.

To set the host asset number:

1. Log in to Webmin.
2. Select ***Configuration*** > ***Host Asset Settings***.
3. In the ***Host Asset Settings*** window, enter the user-assigned host asset number (up to 32 ASCII characters long) in the ***Change Value to*** column.
4. Select ***Save***.

The host asset changes take effect immediately.

7.14 Changing passwords

You can change the passwords for the biomed and clinical users.

WARNING **Control of this user's password is critical to ensure that Webmin on this device is accessed only by trained and authorized personnel. Failure to limit access of Webmin to trained and authorized personnel only may compromise patient safety and/or system performance.**

NOTE: Username and password are case sensitive. The allowed characters for "biomed" and "clinical" passwords are: alpha [A-Z, a-z], numeric [0-9], and space. The password length shall be between 8 and 16 characters.

NOTE: The user name "biomed" is common for the ***Webmin*** and ***Service Calibrations*** login screens. A change to the "biomed" password will affect both service interfaces.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Passwords***.
3. In the ***Edit User Password*** window, change the ***biomed*** or ***clinical*** user's password as required.
4. Select ***Save***.

The change will take effect immediately.

7.15 Restarting the patient monitor

You can use the Restart module in Webmin to restart the patient monitor after making configuration changes that require a manual restart to come into effect. For example after changing network or language settings, or adding activation codes for licenses.

NOTE: Loss of monitoring - This function is enabled only when the patient monitor is in a discharged state. Before restarting the patient monitor, verify that the patient is discharged from the patient monitor.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Restart***.
3. In the ***Monitor Restart*** window, select ***Restart***.

   The patient monitor will shutdown and restart automatically.

7.16 Setting up the remote service

7.16.1 Configuring the remote service

To configure the Insite with Exc remote service tool.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Remote Service***.
3. In the ***Sub-Modules for Remote Service*** menu, select ***Configuration***.

4. In the ***Remote Service Configuration*** window, enter the applicable data:

HTTP Proxy Server Configuration		
Item	**Description**	**Comments**
Address	- If this site uses an HTTP proxy server, a specific site proxy server IP ***Address*** and ***Port*** number are required for the ***Remote Service*** communication to work. Otherwise, select ***None***. - If the HTTP proxy server requires user authorization, a specific ***Username***, and ***Password*** is required. Otherwise, select ***None***.	These values are determined by the customer.
Port		
Username and Password		

Remote Service Configuration		
Item	**Description**	**Comments**
System ID	Identifies the system to the GE back office servers.	These values are read-only and are unique.
Serial Number	Identifies the unit and is set at the time of manufacture.	
Enterprise URL	If required, designate the address of the GE backoffice servers required to communicate with the ***Remote Service Agent***.	This address should never be changed unless explicit instructions are given to do so.
Enterprise Tunnel URL	If required, designate the address of the GE backoffice servers required to communicate with the tunneling agent.	
Protocol	Identifies the protocol used to communicate with the enterprise servers.	This field is read-only and cannot be changed.

5. Select ***Save***.

The changes will take effect immediately.

7.16.2 Enabling remote service agent/ connection

After the server has been configured for remote serviceability, the remote service agent must be enabled for use.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Remote Service***.
3. In the ***Sub-Modules for Remote Service*** menu, select ***Control***.
4. In the ***Remote Service Control*** window, enable or disable the ***Service Agent*** by selecting ***Enable*** or ***Disable***.
5. Select ***Save***.

The changes will take effect immediately.

7.16.3 Testing the connectivity

NOTE: Connectivity test works only if the connection is enabled, that is the current state is enabled/running.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Remote Service***.
3. In the ***Sub-Modules for Remote Service*** menu, select ***Control***.
4. Below ***Test Connectivity*** in the ***Remote Service Control*** window, select ***Test*** to test the connectivity to the remote service server.
5. Verify that ***Connection to Enterprice URL*** and ***Connection to Tunnel URL*** both pass the test.
6. If one of the connection tests fail, check the failure description and fix the connectivity issue. Re-test the connectivity.

7.17 Transferring settings from one patient monitor to other patient monitors

You can transfer platform and/or clinical settings from one patient monitor to another, take backup copies of the settings to an external device and restore the settings from an external device.

1. Complete the platform and/or clinical configuration in one patient monitor.
2. Save the completed platform and/or clinical configuration settings to an external device (section 7.17.1 Saving settings).
3. Load the saved platform and/or clinical configuration settings from an external device to the destination patient monitors (section 7.17.2 Loading settings).
4. Activate the loaded platform and/or clinical configuration settings in the destination patient monitors (section 7.17.3 Activating settings).
5. Some platform settings can't be transferred from one patient monitor to another. See section 7.17.3 Activating settings for details. Configure these unaffected settings manually in the destination patient monitor following the instructions in sections 7.2 Configuring the network, 7.4 Setting unit and bed name, 7.13 Setting the host asset number and 7.18 License management.

NOTE: Clinical settings are software package and profile specific. For example, you can transfer clinical settings from a patient monitor with OR and PACU software only to other patient monitors with OR and/or PACU software, not to patient monitors with ICU, NICU and ED software.

7.17.1 Saving settings

NOTE: The patient monitor must not be configured to receive any alarm notifications from other monitors when the settings are saved.

Before saving the settings to a patient monitor that is connected to the MC or S/5 Network, make sure that the monitor is not receiving any alarm notifications from other monitors:

1. Select ***Data&Pages > Other Patients > Receive Alarms.***
2. Check that ***Change All Notifications*** is set to ***Off***.

Save the completed platform and/or clinical settings to a service PC or USB flash drive.

1. Log in to Webmin.

2. Select ***Configuration*** > ***Settings***.
3. In the ***Sub-Modules for Settings*** menu, select ***Save***.
4. In the ***Save Settings*** window, select the radio button next to the type of settings you want to save.
5. Select ***Save***.
6. According to your Webmin access:

a. If you are using Webmin on a service PC, you can save the settings file to any mass storage device connected to the service PC:
   - In the ***File Download*** dialog box, select ***Save***.
   - In the ***Save as*** dialog box, select the destination drive and folder and select ***Save.***

   NOTE: You may change the default filename, but do not change the file extension.

b. If you are using Webmin locally through the integrated browser, you can save the settings file to a USB flash drive that is connected to one of the patient monitor's USB ports:
   - The ***Save As*** window will show you the name of the created settings file.
   - Select ***Save*** to save the settings file to the USB flash drive.

   NOTE: You may change the default filename, but do not change the file extension.

   NOTE: Do not disconnect the USB storage device until saving is complete.

7.17.2 Loading settings

Load the saved platform and/or clinical settings from a service PC or USB flash drive to the patient monitor.

NOTE: The loaded settings will remain in an inactive state in the patient monitor until they are purposely activated by the user (see section"7.17.3 Activating settings").

1. Log in to Webmin.
2. Select ***Configuration*** > ***Settings***.
3. In the ***Sub-Modules for Settings*** menu, select ***Load***.
4. According to your Webmin access:

a. If you are using Webmin on a service PC, you can load the settings file from any mass storage device connected to the service PC:
   - In the ***Load Settings*** window, enter the file name or select ***Browse*** to select a file from the ***Choose File to Upload*** dialog box.
   - Select ***Upload*** to load the settings.

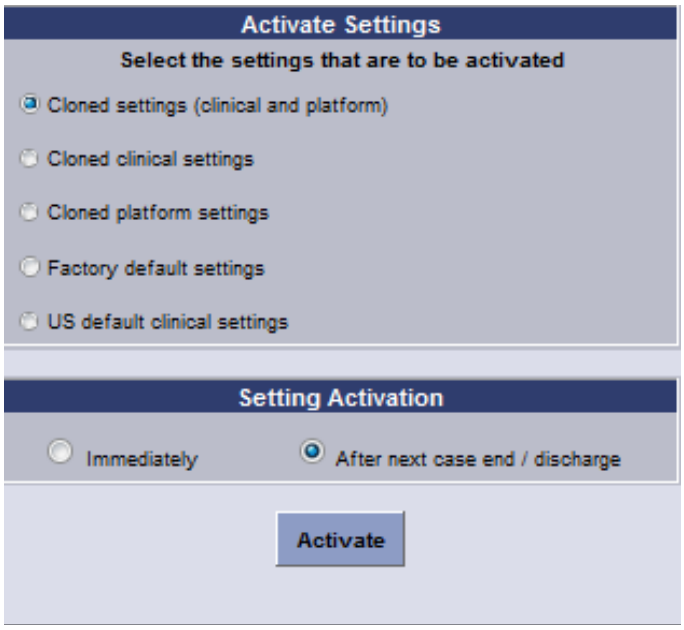
b. If you are using Webmin locally through the integrated browser, you can load the settings file from a USB flash drive that is connected to one of the patient monitor's USB ports:
   - The ***Load Settings*** window will show you the available settings files. Select the settings file to be loaded.
   - Select ***Load Settings*** to load the selected settings file from the USB flash drive.

   NOTE: Do not disconnect the USB storage device until loading is complete.

7.17.3 Activating settings

NOTE: Settings activation takes place only when the patient monitor is in a case reset / patient discharged state. If you are going to activate settings immediately, verify that the patient monitor is in a case reset / patient discharged state. You can alternatively initiate the setting activation process with a delay during an active patient case, but the new settings will activate only after the next case reset / patient discharged.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Settings***.
3. In the ***Sub-Modules for Settings*** menu, select ***Activate***.
4. In the ***Activate Settings*** window, select the settings that you want to activate:



- Select ***Cloned settings (clinical and platform)*** to activate both the clinical and platform settings.
- Select ***Cloned clinical settings*** to activate only loaded clinical settings.
- Select ***Cloned platform settings*** to activate only loaded platform settings.

NOTE: Activation of the cloned clinical or platform settings will not effect the following settings in the target patient monitor:

– Network
– Unit and Bed Name
– Host Asset Settings
– Licenses

Remember to configure the unaffected settings manually in the target patient monitor.

NOTE: Check and manually modify the following WLAN settings after activating them in the destination monitor:

– RTS Threshold
– Fragmentation Threshold
– TXOP for Best Effort
– TXOP for Background

- Select ***Factory default settings*** to restore all platform and clinical settings back to the factory defaults.
- Select ***US default clinical settings*** to restore all clinical and platform settings back to the US specific factory defaults.

NOTE: Activation of the factory defaults and US factory defaults will leave the following settings in the target patient monitor unaffected:

- Host Asset Settings
- Licenses

5. In the ***Setting Activation***, select whether you want the new settings to take effect immediately or after the next case end / discharge:

Select	To	NOTE
Immediately	Activate the new settings Immediately.	The patient monitor must be in a case reset / patient discharged state.
After next case end / discharge	Take the new settings in use with a delay, after the next case end / patient discharge.	This option allows you to initiate the setting activation process with a delay during an active patient case. The new settings will activate only after the next case end / patient discharge.

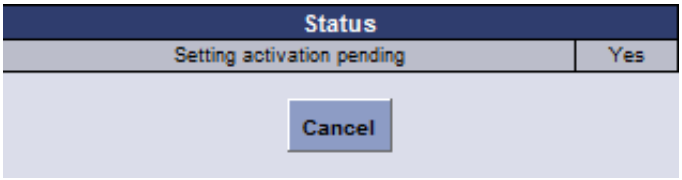
6. Select ***Activate*** to start the settings activation process.

- **If immediate settings activation was selected:**
  a. Wait until the settings activation is completed and the patient monitor has performed an automatic restart.
  b. Verify that the settings activation was successful and the patient monitor is running the activated settings.
- **If after next case end / discharge settings activation was selected:**
  a. The patient monitor will show a message ***Settings activation on next discharge/after next case end*** on the display until the next case end / patient discharge. The patient monitoring can be continued normally until then.
  b. Settings activation will start automatically after the next case end / patient discharge, unless this process is canceled by the user.
  c. Wait until the settings activation is completed and the patient monitor has performed an automatic restart.
  d. Verify that the settings activation was successful and the patient monitor is running the activated settings.

7.17.4 Canceling pending settings activation

You can cancel pending settings activation anytime while the message ***Setting activation after next case end / Setting activation after next discharge*** is shown on the display.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Settings***.
3. In the ***Sub-Modules for Settings*** menu, select ***Activate***.
4. Select ***Cancel*** to cancel settings activation.



7.18 License management

You can upload a license file that contains all acquired licenses and activation codes. Alternatively, you can enable and activate individual software packages and host software feature licenses by entering the required activation code manually.

NOTE: Contact GE Healthcare to acquire activation codes for licenses.

7.18.1 Enabling and activating host software package

NOTE: You can have several software packages enabled, but only one of them can be selected active at a time.

Enter an activation code to enable the software package.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Licenses***.
3. In the ***Sub-Modules for Licenses*** window, select ***Software Package***.
4. Below ***Software Package*** in the ***Software Package*** window:
   a. From the ***Status*** drop-down list, select ***ENABLED***.
   b. Enter a valid ***Activation Code*** for the new software version.
5. Select ***Save***.
6. To activate a software package, select the desired radio button in the ***Active*** column.
7. Select ***Save***.

All license changes take effect after the next patient monitor restart.

NOTE: The software license for the active host software version is shown in the ***Software Package*** window below the ***Active Software License***. This license is typically entered before activating a new host software version, see Software Management.

WARNING **If the software package is changed, all clinical settings will reset to factory defaults.**

7.18.2 Enabling and activating host software feature licenses

Feature licenses are available either as permanent or as trial licenses. Activation codes for trial licenses are valid for 90-days.

Enter the activation code to enable a software feature.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Licenses***.
3. In the ***Sub-Modules for Licenses*** menu, select ***Host Licensing***.
4. In the ***Host License*** window, enter the activation code by the appropriate ***OPTIONAL*** host license feature.

NOTE: To activate an ***OPTIONAL-TRIAL*** license, enter the expiration date in addition to the activation code.

5. From the ***Status*** drop-down list, select ***ENABLED***.
6. Select ***Save***.

All license changes take effect after the next patient monitor restart.

7.18.3 Uploading license file

Upload a valid license file as follows:

1. Log in to Webmin.
2. Select ***Configuration*** > ***Licenses***.
3. In the ***Sub-Modules for Licenses*** window, select ***Upload License***.
4. According to your Webmin access:
   a. If you are using Webmin on a service PC, you can upload the license file from any mass storage device connected to the service PC. In the ***Upload Software Package and Host License*** window, enter the file name of the license file or select ***Browse*** to select a file using the ***Choose File to Upload*** dialog box.
   b. If you are using Webmin locally through the integrated browser, you can upload the license file from a USB flash drive that is connected to one of the patient monitor's USB ports. In the ***Upload Software Package and Host License*** window, select the license file to be uploaded.

   NOTE: Do not disconnect the USB storage device until downloading is complete.
5. Select ***Upload*** to upload the license file.
6. Verify that the information populated in the ***Software Package*** and ***Host License*** tables is accurate.

All license changes take effect after the next patient monitor restart.

7.19 Software management

Software installation consists of two main steps: software transfer and software activation.

7.19.1 Transferring software

To begin software installation, you first transfer the new software into the inactive memory partition of the patient monitor. Transfer software using the GE Healthcare Software Transfer Utility that runs on a service PC. With this application, you can transfer new software from a software CD to the patient monitors over the CARESCAPE Network IX (IX Network) or a crossover cable. The new, transferred software is inactive in the patient monitor(s) until you activate it. Alternatively you can use InSite ExC to transfer the software. You can transfer the software in the background, without affecting normal patient monitoring.

NOTE: The software CD contains both the patient monitor software and the Software Transfer Utility, the tool to install the software. Software transfer procedure is described in detail in the CARESCAPE Modular Monitors Software Installation Instruction that is delivered together with the software CD.

7.19.2 Activating the installed software

After transferring the new software to the patient monitors, take the transferred, inactive software into use by activating it.

Before you start:

- Connect the patient monitor to the AC mains during software activation. Software activation does not start if the patient monitor uses its battery.
- Verify the compatibility of the connected bedside and network devices with the new software version. Refer to the latest version of the CARESCAPE Modular Monitors Supplemental Information Manual for a list of compatible network and bedside devices.
- Contact GE Healthcare to get the latest version of the user and service documentation
- Contact GE Healthcare for any inquiries regarding the software CD and/or activation code for the new host software version.

NOTE: Loss of monitoring - Software is activated only when the patient monitor is in a patient discharged / case reset state. Normal patient monitoring is unavailable until the software activation is completed. This may take up to 10 minutes.

NOTE: The existing clinical and platform settings of the patient monitor are saved and are not affected by the activation of the new patient monitor software version. However, any new or changed clinical and platform settings in the activated patient monitor software version have their factory default values and may require manual configuration. For more information, refer to the latest version of the CARESCAPE Modular Monitors Supplemental Information Manual. Contact GE Healthcare for any inquiries regarding the software CD and/or activation code for the new host software version.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Software Management***.
   The ***Software Management*** window displays.
3. In the ***Software List***, select the software that you want to activate::

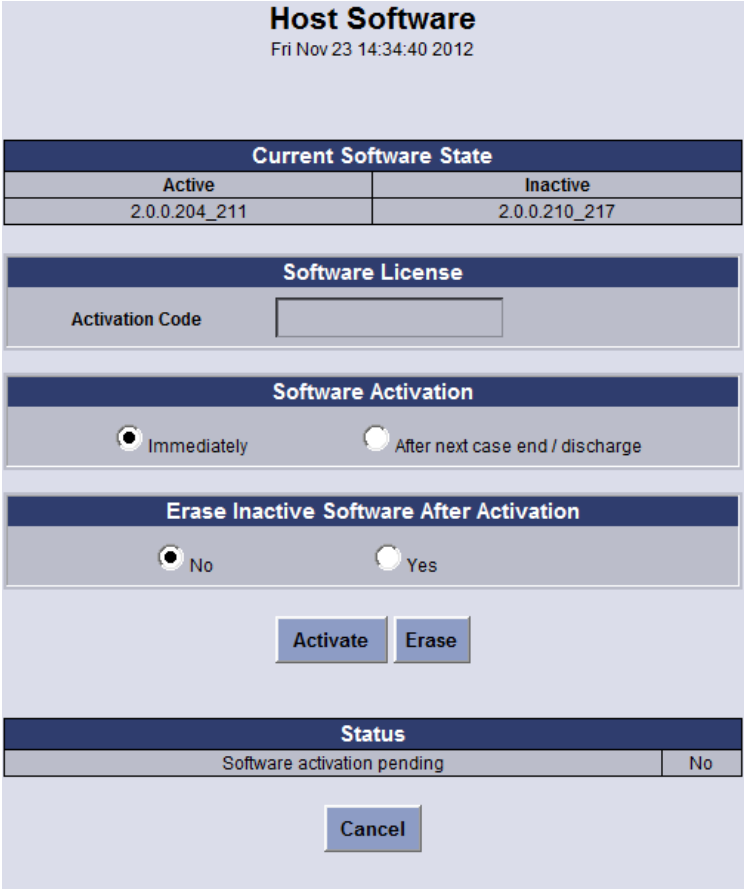
Software	**Purpose of use**
Host Software	Patient monitor software for the host unit including: • PUIC SW for the DC/DC board • EMBC SW for the CPU Carrier board
PDM Software	CARESCAPE Patient Data Module
PiCCO Software	E-PiCCO Module.
sGAS Software	CARESCAPE Respiratory Modules, E-sCO, E-sCOV, E-sCAiO, E-sCAiOV.

4. Select ***Next***.
   The selected ***Software activation*** window appears.
5. According to the software you are activating, proceed to:
   - Activating host software immediately
   - Activating host software after next case end / discharge
   - Activating module software

Activating host software immediately

Before you start:

- Make sure the patient monitor is in a case reset / patient discharged state.



1. In the ***Host Software*** window, verify that the software you are activating is listed as ***Inactive*** in ***Current Software State***.
2. In ***Software License***, if applicable, enter the ***Activation Code*** for the new software version.
3. In ***Software Activation***, select ***Immediately***.
4. In ***Erase Inactive Software After Activation***, select:

   No - to keep the currently active software version as inactive software after the new software version is activated successfully. This option lets you restore the patient monitor to the previous software version later.

   Yes - to erase the currently active software version permanently after the new software version is activated successfully.

5. Select ***Activate*** to start the host software activation.
6. Confirm activation by selecting ***Yes*** in the Host Software window that opens.

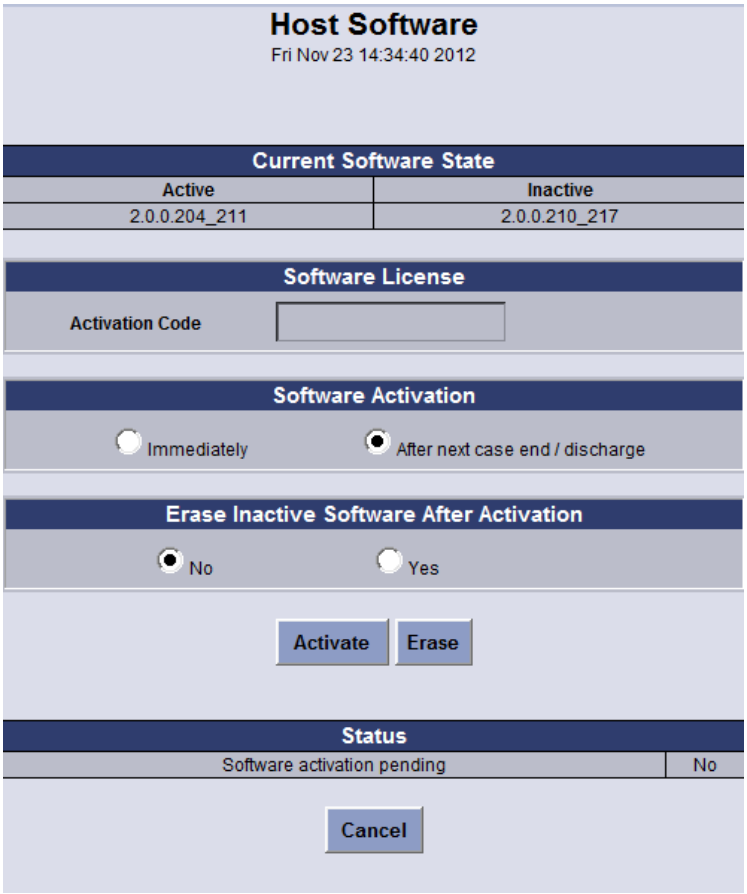
   The patient monitor shows a screen saver that informs about the ongoing software activation:

Software activation in progress. Do not disconnect any measurement modules or other peripheral devices, or shut down the monitor until the software activation is complete. Activation may take up to 10 minutes. The device will automatically restart once the software activation is complete.

7. Wait until the software activation completes and the patient monitor restarts automatically.
8. Verify that the software activation is successful and the patient monitor runs the activated software.

Activating host software after next case end / discharge

If you want to activate the new host software with a time delay, that is, after the next case end / patient discharge, follow this instruction. You can initiate the software activation process with a delay during an active patient case.



1. In the ***Host Software*** window, verify that the software that you activate is listed as ***Inactive*** in ***Current Software State***.
2. In ***Software License***, if applicable, enter the ***Activation Code*** for the new software version.
3. In ***Software Activation***, select ***After next case end / discharge.***

4. In ***Erase Inactive Software After Activation***, select:

   No - to keep the currently active software version as inactive software after the new software version is activated successfully. This option lets you restore the patient monitor to the previous software version later.

   Yes - to erase the currently active software version permanently after the new software version is successfully activated.

5. Select ***Activate*** to start the software activation.
6. Confirm activation by selecting ***Yes*** in the ***Host Software*** window that opens.
   The patient monitor shows a message ***Software activation after next case end / after next discharge*** on the display until the next case end or patient discharge. The patient monitoring can be continued normally until then.
7. Software activation will start automatically after the next case end / patient discharge, unless this process is cancelled before it starts.

The patient monitor informs clinical users about pending software activation by showing the message ***Software activation after next case end / after next discharge*** on the display.

The software activation starts automatically after the clinical user performs a patient discharge / case end the next time. The patient monitor shows a screen saver that informs about the ongoing software activation:

Software activation in progress. Do not disconnect any measurement modules or other peripheral devices, or shut down the monitor until the software activation is complete. Activation may take up to 10 minutes. The device will automatically restart once the software activation is complete.

The clinical user must wait until the software activation is complete and the patient monitor restarts automatically. If the patient monitor starts up normally and no error messages appear on the display, the activation is successful.

Activating module software

Follow this instruction when you want to:

- activate new sGAS software to a CARESCAPE Respiratory Module
- activate new PDM software to a CARESCAPE Patient Data Module
- activate new PiCCO software to a E-PiCCO Module.

Before you start:

- Make sure that the patient monitor is in a case reset / patient discharge state.
- Make sure that the target parameter module is connected to the patient monitor.

NOTE: Do not disconnect the parameter module, or shut down the patient monitor until the software activation is completed and the parameter module has restarted.

To activate module software:

1. In the ***PDM/sGAS/PiCCO Software*** window, in ***Current Software State***, verify that the software you want to activate is listed as ***Inactive***.
2. Select ***Activate*** to activate the inactive software.
3. Confirm activation by selecting ***Yes*** in the ***Host Software*** window that opens.
   The patient monitor will now start activating the module software. It will show a message "***PDM module removed***", "***Gas measurements removed***", or "***CO measurement removed***" on the patient monitor screen. This message will remain until the module software activation is completed and the parameter module has restarted. This may take up to 15

minutes. Do not shut down the patient monitor or disconnect the parameter modules. The parameter module restarts automatically after the software activation is complete.

4. After the parameter module restarts, verify that the software activation is successful and the parameter module runs the activated software.

7.19.3 Canceling pending host software activation

You can cancel a pending host software activation at any time while the message ***Software activation after next discharge/after next case end*** is shown on the display.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Software Management*.**
   The ***Software Management*** window opens.
3. Select ***Host Software*** from the ***Software List*** and select ***Next***.
4. In the ***Host Software*** window, below ***Status***, verify that the ***Software activation pending*** is ***Yes***.
5. Select ***Cancel***.

The pending software activation is cancelled and the patient monitor continues running the current software version.

7.19.4 Erasing an inactive software version.

You can erase an inactive host software version from the patient monitor. Erasing can prevent the activation of a wrong software version by mistake.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Software Management***.
   The ***Software Management*** window opens.
3. Select the software that you want to erase and select ***Next***.
   The selected software activation window appears.
4. Select ***Erase*** to erase the inactive software.

For your notes:

8 Installation checkout

The purpose of the installation checkout procedure is to ensure that the system is properly installed and configured for use.

Service personnel shall perform the following checkout procedure for the monitoring system after the hardware installation and platform configuration is completed:

- 8.1. Visual inspection
- 8.2. Electrical safety tests

  NOTE: The manufacturer has performed the electrical safety test for the patient monitor and acquisition modules during final inspection. You do not have to perform the electrical safety tests during installation checkout, if there is less than 12 months since the patient monitor was manufactured. Check the manufacturing week and year from the device plate (see section 3.4.2. Equipment identification).
- 8.3. Functional check

NOTE: Refer to chapter 10. Maintenance and checkout to see the recommended checkout procedure after corrective and planned maintenance.

8.1 Visual inspection

Perform the following visual inspection to the installed monitoring system:

- Carefully inspect the patient monitor and the connected peripheral devices for any damage.
- Verify that the patient monitor and the connected peripheral devices are properly mounted with specified mounting solutions.
- Verify that the cables between the patient monitor and the connected peripheral devices are intact, properly connected and secured to the right connectors.
- Verify that the modules are properly connected and locked.

The cleaning precautions, requirements, procedures, and recommended cleaning solutions for the patient monitor are described in the patient monitor's user's manual. For details about cleaning, disinfecting and sterilizing the accessories, see the instructions for use in the accessory package.

8.2 Electrical safety tests

Electrical safety tests provide a method of determining if potential electrical health hazards to the patient or operator of the device exist.

8.2.1 Test setup

Test conditions

Perform electrical safety tests under normal ambient conditions of temperature, humidity and pressure.

Test equipment

The test equipment required to perform electrical safety tests is listed below.

Tool	Part Number / Requirement
Safety Analyzer / Leakage Current Tester	Equivalent to the circuits shown.
Safety Test Body Kit [1)]	P/N M1155870 or equivalent

1 Instead of the test bodies included in the safety test body kit, other applicable test bodies with all pins connected together may be used.

Perform electrical safety tests using an electrical safety analyzer according to IEC 60601-1, UL 60601-1, EN 60601-1 or CSA C22.2 No. 601.1. The schematics in this section provide a general understanding of the test equipment. Actual configuration of test equipment may vary. Refer to the instructions delivered with the safety analyzer to perform each test.

The patient monitor being tested should be placed on an insulating surface.

NOTE: Before proceeding, make sure that all test equipment is properly calibrated, maintained and functioning.

NOTE: GE recommends that the qualified personnel performing the tests should record the test results of each electrical safety test, for example by using the installation / maintenance check forms included in this manual.

System setup

These instructions are intended for every component in the system. Ensure that all system components are properly connected to the patient monitor.

8.2.2 Power outlet

Verify that the power outlet is wired correctly according to the country's electrical code standard before starting the following electrical safety tests. The results of the following tests will be inaccurate unless a properly wired power outlet is used.

8.2.3 Power cord and plug

Verify that the power cord being used with the patient monitor is good. To do this, check the following:

- Inspect the power cord for wear or damage regularly. If damage is suspected, test for continuity through each conductor of the power cord connector. Replace the power cord, as necessary, with a regulatory approved cord for the country of use.

WARNING **Use only AC power cords recommended or manufactured by GE.**

8.2.4 Ground (earth) integrity

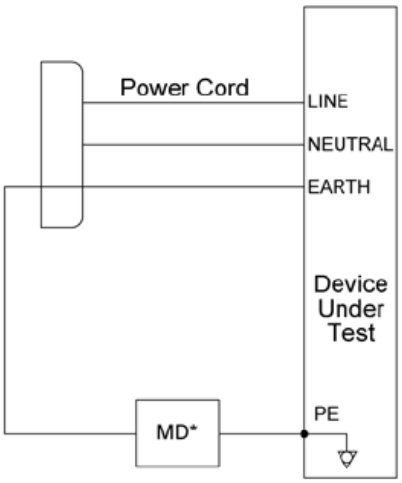
Listed below are two alternative methods for checking the ground (earth) integrity: "a) Ground continuity test" and "b) Impedance of protective earth connection". These tests determine whether the device's exposed metal and power inlet's earth (ground) connection has a power ground fault condition.

Perform either test a) or test b) in accordance to your local regulations.

NOTE: Refer to the instructions delivered with the safety analyzer to perform each test.

a) Ground continuity test

The measuring device (MD) in the diagram below may be a digital multimeter or part of the safety analyzer.



Acceptance criteria:

- For equipment without a power supply cord, the impedance between the protective earth terminal and any accessible metal part which is protectively earthed shall not exceed 0.1 ohms.
- For equipment with a power supply cord, the impedance between the protective earth pin in the mains plug and any accessible metal part which is protectively earthed shall not exceed 0.2 ohms.

b) Impedance of protective earth connection

This test is normally only required as a manufacturing production test to receive safety agency compliance. Some country agencies do require this test after field equipment repairs (i.e., Germany's DIN VDE 0751 standards). Consult your country/local safety agency if in doubt.

Check compliance as follows:

1. A current of 25A from a current source with a frequency of 50 or 60 Hz with a no-load voltage not exceeding 6 V is passed for at least 5 seconds, but not more than 10 seconds, through the protective earth terminal or the protective earth pin in the mains plug and each accessible metal part which could become live in case of failure in basic insulation.

2. The voltage drop between the parts described is measured and the impedance determined from the current and voltage drop. It shall not exceed the values indicated.

   When taking this measurement, flex the unit's power cord along its length. There should be no fluctuations in resistance.

Acceptance criteria:

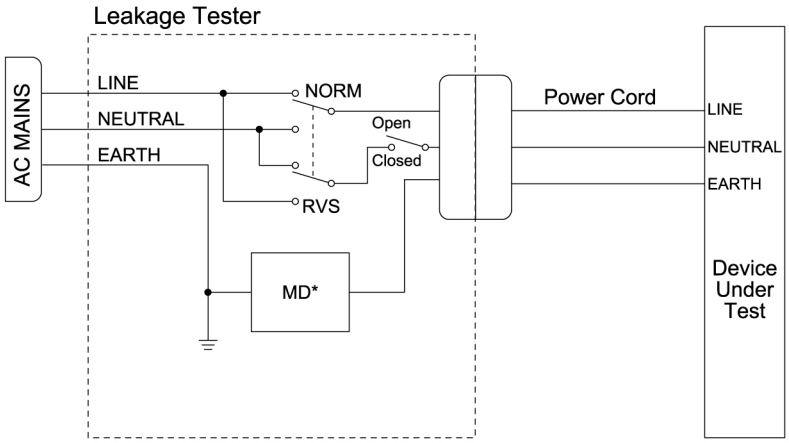
- For equipment without a power supply cord, the impedance between the protective earth terminal and any accessible metal part which is protectively earthed shall not exceed 0.1 Ohms.
- For equipment with a power supply cord, the impedance between the protective earth pin in the mains plug and any accessible metal part which is protectively earthed shall not exceed 0.2 Ohms.

8.2.5 Earth leakage current test

This test measures the current leakage flowing from the mains part through or across the insulation into the protective earth conductor of the device under test.

Perform this test both in Normal Condition (NC) and in a Single Fault Condition (SFC), where one of the supply conductors is open at a time. Perform the test with normal and reverse polarity.

NOTE: Refer to the instructions delivered with the safety analyzer to perform this test.



NOTE: *The measuring device (MD) represents the network and voltage measuring instrument and its frequency characters according to IEC 60601-1.

1. Configure the safety analyzer as follows (NC):
   – Polarity: NORMAL
   – Neutral: CLOSED

2. Power on the device under test.

3. Read and record the current leakage indicated on the safety tester.

4. Configure the safety analyzer as follows (SFC):
   – Polarity: NORMAL
   – Neutral: OPEN

5. Read and record the current leakage indicated on the safety tester.

6. Configure the safety analyzer as follows (SFC):
   – Polarity: REVERSED
   – Neutral: OPEN

7. Read and record the current leakage indicated on the safety tester.

8. Configure the safety analyzer as follows (NC):
   – Polarity: REVERSED
   – Neutral: CLOSED

9. Read and record the current leakage indicated on the safety tester.

10. Power off the device under test.

Acceptance criteria in Normal Condition (NC):

- All readings shall be less than or equal to 300 μA f*or installations that require compliance to UL 60601-1 requirements.*
- All readings shall be less than or equal to 500 μA f*or installations that require compliance to EN 60601-1 / IEC 60601-1 requirements.*

Acceptance criteria in Single Fault Condition (SFC) – one of the supply conductors open at a time:

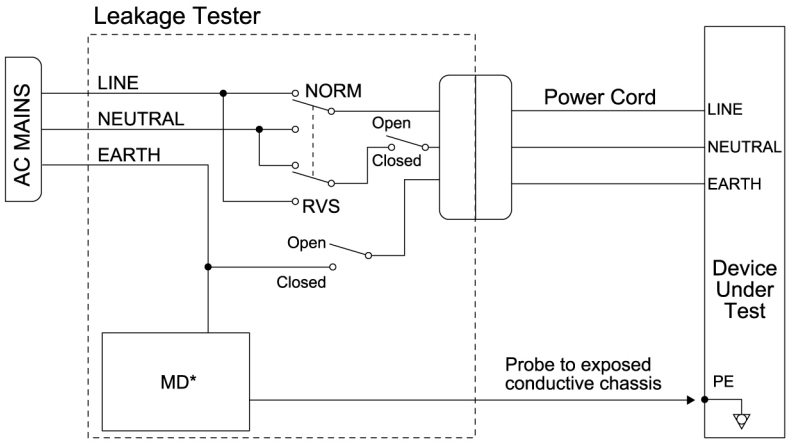
- All readings shall be less than or equal to 1 mA.

8.2.6 Enclosure leakage current (touch current) test

This test measures current leakage through the exposed conductive parts on the device under test.

Perform the test in Normal Condition (NC) and in two different Single Fault Conditions (SFC): 1) earth open and 2) one of the supply conductors open at a time. Perform the test with normal and reverse polarity.

NOTE: Refer to the instructions delivered with the safety analyzer to perform this test.



NOTE: *The measuring device (MD) represents the network and voltage measuring instrument and its frequency characters according to IEC 60601-1.

1. Configure the safety analyzer as follows (NC):
   - Polarity: NORMAL
   - Neutral: CLOSED
   - Earth (GND): CLOSED

2. Power on the device under test.

3. Read and record the current leakage indicated on the safety tester.

4. Configure the safety analyzer as follows (SFC):
   – Polarity: NORMAL
   – Neutral: OPEN
   – Earth (GND): CLOSED

5. Read and record the current leakage indicated on the safety tester.

6. Configure the safety analyzer as follows (SFC):
   – Polarity: NORMAL
   – Neutral: CLOSED
   – Earth (GND): OPEN

7. Read and record the current leakage indicated on the safety tester.

8. Configure the safety analyzer as follows (SFC):
   – Polarity: REVERSED
   – Neutral: CLOSED
   – Earth (GND): OPEN

9. Read and record the current leakage indicated on the safety tester.

10. Configure the safety analyzer as follows (SFC):
    – Polarity: REVERSED
    – Neutral: OPEN
    – Earth (GND): CLOSED

11. Read and record the current leakage indicated on the safety tester.

12. Configure the safety analyzer as follows (NC):
    – Polarity: REVERSED
    – Neutral: CLOSED
    – Earth (GND): CLOSED

13. Read and record the current leakage indicated on the safety tester.

14. Power off the device under test.

Acceptance criteria in Normal Condition (NC):

- All readings shall be less than or equal to 100 μA

Acceptance criteria in Single Fault Condition (SFC) – earth open or one of the supply conductors open at a time:

- All readings shall be less than or equal to 300 µA for *installations that require compliance to UL 60601-1 requirements.*
- All readings shall be less than or equal to 500 µA for *installations that require compliance to EN 60601-1 / IEC 60601-1 requirements.*

8.2.7 Patient leakage current tests – overview

The following table specifies the parameter modules and the related patient connectors to be tested in the 8.2.8. Patient (source) leakage current tests and in the 8.2.9. Patient (sink) leakage current tests.

Use the safety test body kit, P/N M1155870 (or equivalent), to perform patient leakage current tests. This safety test body kit contains various patient connectors where all pins are shorted out together. For information on which test body to use for each patient connector, refer to the service instructions included in the safety test body kit.

NOTE: If not otherwise stated in the table below, each test body is connected directly to the specified connector in the patient module.

Table 1 Patient connectors to be tested with each module

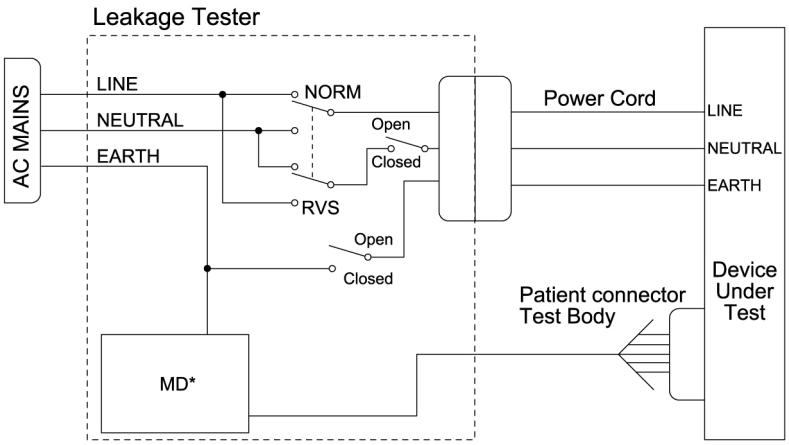
Module	Patient connector
E-PSMP, E-PSMPW	ECG & SpO2
E-PSM, E-PSMW	ECG & SpO2
E-P, E-PT	P3/P7
E-PP	P5
E-COP, E-COPSv	P4/P8
E-PiCCO	P8
E-NSATX, E-NSAT	SpO2
E-Masimo	SpO2
E-NMT	NMT
E-BIS	1. Connect the BISx Digital Signal Processing Unit with the Patient Interface Cable (PIC+) to the E-BIS module. 2. Connect the specified test body to the PIC+ cable. NOTE: The patient isolation is in the BISx Digital Signal Processing Unit , not in the E-BIS module.
E-Entropy	1. Connect an Entropy sensor cable to the module. 2. Connect the specified test body to the Entropy sensor cable.
E-EEG	1. Disconnect the N-EEG headbox from the E-EEG module. 2. Connect the test body directly to the E-EEG module.
PDM	ECG & SpO2

8.2.8 Patient (source) leakage current tests

This procedure measures the leakage current from an applied part connector of the device to ground.

Perform the test in Normal Condition (NC) and in two different Single Fault Conditions (SFC): 1) earth open and 2) one of the supply conductors open at a time.
Perform test with normal and reverse polarity.

NOTE: Refer to the instructions delivered with the safety analyzer to perform this test.



NOTE: *The measuring device (MD) represents the network and voltage measuring instrument and its frequency characters according to IEC 60601-1.

NOTE: Perform this test for all the connected parameter modules and patient connectors specified in Table 1.

1. Configure the safety analyzer as follows (NC):
   - Polarity: NORMAL
   - Neutral: CLOSED
   - Earth (GND): CLOSED
2. Power on the device under test.
3. Read and record the current leakage indicated on the safety tester.
4. Configure the safety analyzer as follows (SFC):
   - Polarity: NORMAL
   - Neutral: OPEN
   - Earth (GND): CLOSED
5. Read and record the current leakage indicated on the safety tester.
6. Configure the safety analyzer as follows (SFC):
   - Polarity: NORMAL
   - Neutral: CLOSED
   - Earth (GND): OPEN
7. Read and record the current leakage indicated on the safety tester.
8. Configure the safety analyzer as follows (SFC):

- Polarity: REVERSED
- Neutral: CLOSED
- Earth (GND): OPEN

9. Read and record the current leakage indicated on the safety tester.
10. Configure the safety analyzer as follows (SFC):
    - Polarity: REVERSED
    - Neutral: OPEN
    - Earth (GND): CLOSED
11. Read and record the current leakage indicated on the safety tester.
12. Configure the safety analyzer as follows (NC):
    - Polarity: REVERSED
    - Neutral: CLOSED
    - Earth (GND): CLOSED
13. Read and record the current leakage indicated on the safety tester.
14. Power off the device under test.
15. Repeat this test for all the connected parameter modules and patient connectors specified in Table 1.

Acceptance criteria in Normal Condition (NC):

- All readings shall be less than or equal to 10 μA.

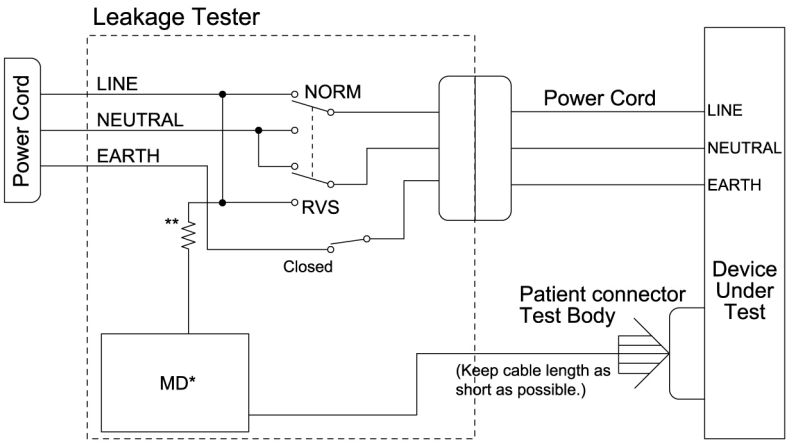
Acceptance criteria in Single Fault Condition (SFC) – earth open or one of the supply conductors open at a time:

- All readings shall be less than or equal to 50 μA.

8.2.9 Patient (sink) leakage current tests

This procedure measures the leakage current from an applied part connector of the device to ground. Perform the test in Normal Condition (NC) with normal and reverse polarity.

NOTE: Refer to the instructions delivered with the safety analyzer to perform this test.



NOTE: *The measuring device (MD) represents the network and voltage measuring instrument and its frequency characters according to IEC 60601-1.

NOTE: **According to IEC-60601, the impedance to protect the circuitry and the person performing the test, but low enough to accept currents higher than the allowable values of the leakage current to be measured.

WARNING **SHOCK HAZARD - The following step causes high voltage at the test body. Do not touch the test body.**

NOTE: Perform this test for all the connected parameter modules and patient connectors specified in Table 1.

1. Configure the safety analyzer as follows:
   – Polarity: NORMAL
   – Neutral: CLOSED
   – GND: CLOSED
2. Power on the device under test.
3. Read and record the current leakage indicated on the safety tester.
4. Configure the safety analyzer as follows:
   – Polarity: REVERSED
   – Neutral: CLOSED
   – GND: CLOSED
5. Read and record the current leakage indicated on the safety tester.
6. Power off the device under test.
7. Repeat this test for all the connected parameter modules and patient connectors specified in Table 1.

Acceptance criteria:

- All readings shall be less than or equal to 50 μA.

8.2.10 Test completion

1. Disconnect the safety analyzer from the power outlet.
2. Disconnect the test equipment from the patient monitor.
3. Disconnect the patient monitor's power cord from the leakage tester.
4. Mark this task as complete on the Appendix A. Installation check form.

8.3 Functional check

The purpose of this functional check is to ensure that the system is properly installed and configured. Cover all peripheral devices that are connected to the patient monitor by performing the applicable tests below. Skip the tests that are not applicable for the installed patient monitor.

8.3.1 Start-up

1. Turn on the patient monitor and perform a cold start.

NOTE: The patient monitor performs a cold start, when the monitor has been off for more than 15 minutes. You can force the patient monitor to perform a cold start earlier by detaching the

monitor batteries and disconnecting the power cord from the wall outlet for a moment before turning the monitor on.

Verify that the patient monitor starts up normally:

- The yellow, red and blue alarm lights are lit momentarily.
- The speaker gives an audible beep.
- The normal monitoring screen appears and there are no error messages on the screen.

NOTE: Refer to section 11. Troubleshooting to see the procedure for battery conditioning and battery replacement, if you receive a ***Condition Battery A or Condition Battery B*** or a ***Battery A failure or Battery B failure*** message.

NOTE: Before taking the patient monitor into use for the first time, the battery should be fully charged. Keep the monitor connected to the mains until the battery is fully charged.

8.3.2 Display

Picture quality

Perform this test both for the integrated main display and for the optional secondary display.

1. Verify that all text is readable and all images are clear.
2. Verify that the brightness is good. Adjust if necessary.

Touchscreen control

Perform this test both for the integrated main display and for the optional secondary display.

1. Verify the operation and the calibration of a touchscreen by touching a corner of an active parameter window. Verify that the related menu is opened.
2. Select to close any open menu and return to the main display.

8.3.3 Device Information

1. Log in to Webmin.
2. Select ***Information > Device Information***.
3. Verify the following:
   - The connected parameter modules are identified.
   - The connected CARESCAPE Network ID interfaces are identified.
   - The connected USB input devices are identified.
4. Stay connected to Webmin.

8.3.4 Configuration Information

1. Select ***Information > Configuration Information***.
2. Verify the following:
   - The host Information is correct.
   - The active software package is correct.
   - The correct host licenses are enabled.
   - The correct PDM licenses are enabled.
   - Patient ID prefix is correctly configured.

- Unit and Bed name are correctly configured.
- S/5 printers are correctly configured.
- IX printers and printer locations are correctly configured.
- Remote service is correctly configured.
- National requirements are correctly configured.
- Network is correctly configured.
- Power Line Frequency is correctly configured.
- MUSE/12SL is correctly configured.
- WLAN is correctly configured.
- Citrix is correctly configured.

3. Log out Webmin.

8.3.5 Keypad and remote

Perform this test for the optional secondary display with a keypad and for the optional remote controller.

1. Press any hard key in the keypad or remote and verify that the related menu is opened on the screen or the related activity is started.
2. Rotate the **Trim Knob** control in either direction to move from option to option on the display until you have an active parameter window or main menu item highlighted. Press the **Trim Knob** control once to select the highlighted option. Verify that the related menu is opened on the screen or the related activity is started.
3. Select to close any open menu and return to the main display.

8.3.6 Mouse

Perform this test only if a mouse is connected to the patient monitor.

1. Move the mouse until the pointer (arrow) is over an active parameter window or a main menu item you wish to select and click the left mouse button once to select it.
2. Select to close the open menu and return to the main display.

8.3.7 Alphanumeric keyboard

Perform this test only if an alphanumeric keyboard is connected to the patient monitor.

1. Select ***Data & Pages > Admit/Discharge*** (or ***Start / End Case***).
2. Select the ***Patient tab > Edit Name & MRN***.
3. Press **Enter** to highlight the ***Medical Record Number*** field.
4. Type some text into the ***Medical Record Number*** field using the connected alphanumeric keyboard. Include some characters that are specific to the chosen keyboard locale to verify that the keyboard language configuration is correct.
5. Select to close the open menu and return to the main display.

8.3.8 Barcode reader

Perform this test only if a barcode reader is connected to the patient monitor.

1. Select ***Data & Pages > Admit/Discharge*** (or ***Start / End Case***).
2. Select the ***Patient*** tab.

3. Scan a test barcode that is applicable to your system:

Parser Type	Test Procedure
Length Delimited or Character Delimited Parser	4. Select ***Scan from Barcode***. 5. Scan a known test barcode obtained from the hospital. NOTE: The barcode data content must be known and in compliance with the completed parser configuration. 6. Verify that the data content in the barcode is correctly populated to the related fields in the ***Patient*** and the ***Administr. Information*** tabs.
No parser	4. Select ***Edit Name & MRN*** and press **Enter** to highlight the ***Medical Record Number*** field. 5. Scan a sample barcode that only contains one piece of information (e.g., a Serial Number barcode from a module's device label). 6. Verify that the data is correctly populated into the ***Medical Record Number*** field.

7. Select to close the open menu and return to the main display.

8.3.9 MC Network and S/5 Network

Perform the following test only if the patient monitor is connected to a wired MC Network or S/5 Network.

NOTE: Make sure that at least one other patient monitor is on the network. The other patient monitor must be in an admitted state and have an active ECG measurement with a simulator signal.

1. Check that a network symbol is displayed in the upper right corner of the screen.

2. Select ***Data & Pages – Other Patients*** and select a patient from the list.

3. Select ***View*** and verify that a window with parameters from another patient displays on the left side of the screen.

4. Select ***Close View*** to close the window.

8.3.10 Wireless LAN

Perform the following test only if the patient monitor is connected to a wireless MC Network or S/5 Network.

NOTE: The wireless network must be properly installed and the patient monitor must be within the wireless coverage area.

NOTE: Make sure that at least one other patient monitor is on the network. The other patient monitor must be in an admitted state and have an active ECG measurement with a simulator signal.

Checkout procedure for wireless patient monitors

Check each wireless patient monitor according to the following procedure.

The purpose of this test is to ensure that each wireless patient monitor is correctly configured

1. Disconnect the network cable from the MC Network connector, if connected.
2. Check that the wireless network symbol and the signal strength symbol are shown and that the signal strength is adequate.
3. Select ***Data & Pages – Other Patients*** and select a patient from the list.
4. Select ***View*** and verify that a window with parameters from another patient displays on the left side of the screen. Check that the waveforms are continuous and there is no data loss.
5. Select ***Close View*** to close the window.
6. Log in to Webmin.
7. Select ***Diagnostics > Ping***.
8. Type the IP address of the patient monitor you just viewed and select ***ping***. Check that the patient monitor replies to the ping command, there are no lost packets and the maximum latency is 250 ms.

   NOTE: The patient monitor withstands a maximum packet loss of 5 packets per 1 million and maximum latency of 250 ms without performance degradation.
9. Select to return to the main display.
10. Reconnect the MC Network cable back to the MC Network connector, if applicable.

Verification procedure for wireless MC Network infrastructure

Verify the wireless MC Network infrastructure according to the procedure described in Appendix C.

The purpose of this test is to ensure the operation of the wireless network infrastructure coverage area with a wireless CARESCAPE Monitor B450.

8.3.11 IX printers

Perform the following test only if the patient monitor is connected to a printer in the IX Network and you did not print a test page while you configured the IX printer.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Printers > Print Test Page***.
3. Select the IX Printer to test.
4. Select ***Save***.
5. Verify that the test page was printed to the selected printer.
6. Repeat steps 3 to 5 for all connected IX printers.

8.3.12 iPanel connection

Perform the following test only if the Citrix / iPanel is configured and in use.

1. Select ***Data & Pages > iPanel*** and verify that the initial program (configured in Webmin) is launched correctly.
2. Select to exit the Citrix thin client.

8.3.13 Insite with EXC

Perform the following test only if remote service is configured and enabled, and you did not test the connectivity already while you enabled it.

1. Log in to Webmin
2. Select ***Configuration > Remote Service***.
3. In the ***Sub-Modules for Remote Service*** menu, select ***Control***.
4. In the ***Remote Service Control*** window under ***Test Connectivity***, select ***Test*** to test the connectivity to the remote service server.
5. Verify that ***Connection to Enterprise URL*** and ***Connection to Tunnel URL*** both "Pass" the test.

If one of the connection tests fail, check the failure description given and fix the connectivity issue. Re-test the connectivity.

8.3.14 Test completion

Discharge Patient or ***Reset Case*** to discard any changes made to the patient monitor configuration during checkout.

- Complete the Appendix A. Installation check form.

For your notes:

9 Theory of operation

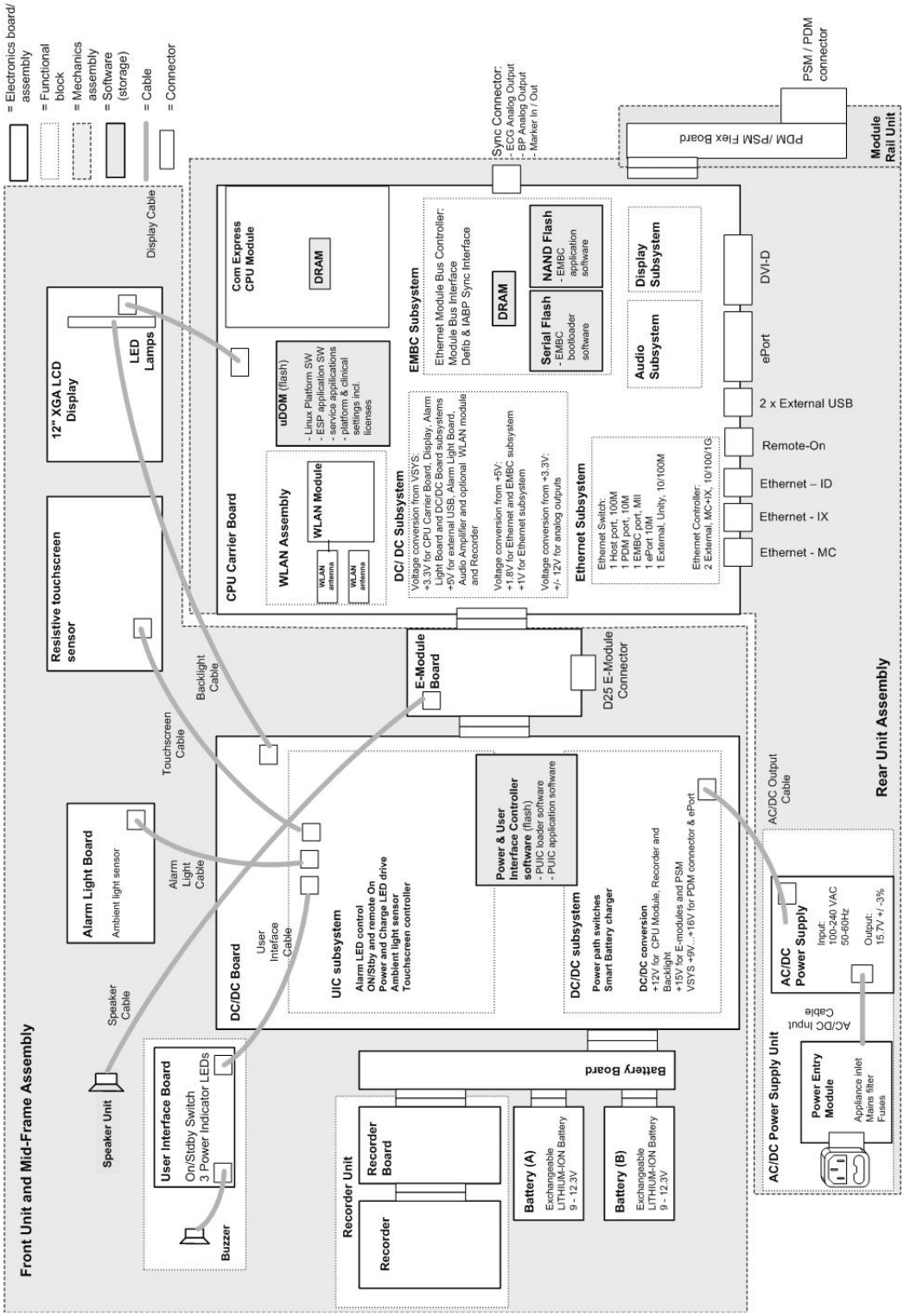


Figure 3 CARESCAPE Monitor B450 System block diagram

The system block diagram shows the functional units of the CARESCAPE Monitor B450.

The following sections describe the operation and interaction of the different subsystems.

9.1 Power Supply/ Power management subsystem

9.1.1 AC/DC Power Supply

Power Entry Module

The power entry module consists of an appliance inlet and mains filter. The fuses in the appliance inlet provide the input protection. AC/DC input cable provides the AC voltage to AC/DC power supply and protective earth connection to the device chassis.

AC/DC Power Supply Unit

The AC/DC power supply unit is a compact, medical, switched-mode power supply with a universal AC input. The high-efficiency design minimizes heat dissipation.

The AC input may vary between 90-264 Vac, 47-63 Hz single phase. It is designed to output 15.7 Vdc ± 3% and 65 W continuous output power for the DC/DC board.

The AC/DC power supply unit has overload and overvoltage protections.

AC/DC Output cable

The AC/DC output cable provides the 15.7 Vdc to the DC/DC board.

Batteries

The patient monitor supports two rechargeable and exchangeable (9-12.3V, 3800 mAh) lithium-ion batteries. They are located in the battery compartment. One battery must be installed at all times, the second one is optional.

The batteries support Smart Battery Data and they communicate with the DC/DC board using the System Management Bus (SMBus).

Battery charging and conditioning can take place either inside the patient monitor or with an external battery charger.

Cooling

The patient monitor uses convection cooling. The ventilation openings of the device are located in the rear of the patient monitor and below the keypad.

The AC/DC power supply and the CPU assembly have integrated heat sinks to enhance the cooling of the patient monitor.

9.2 DC/DC Board

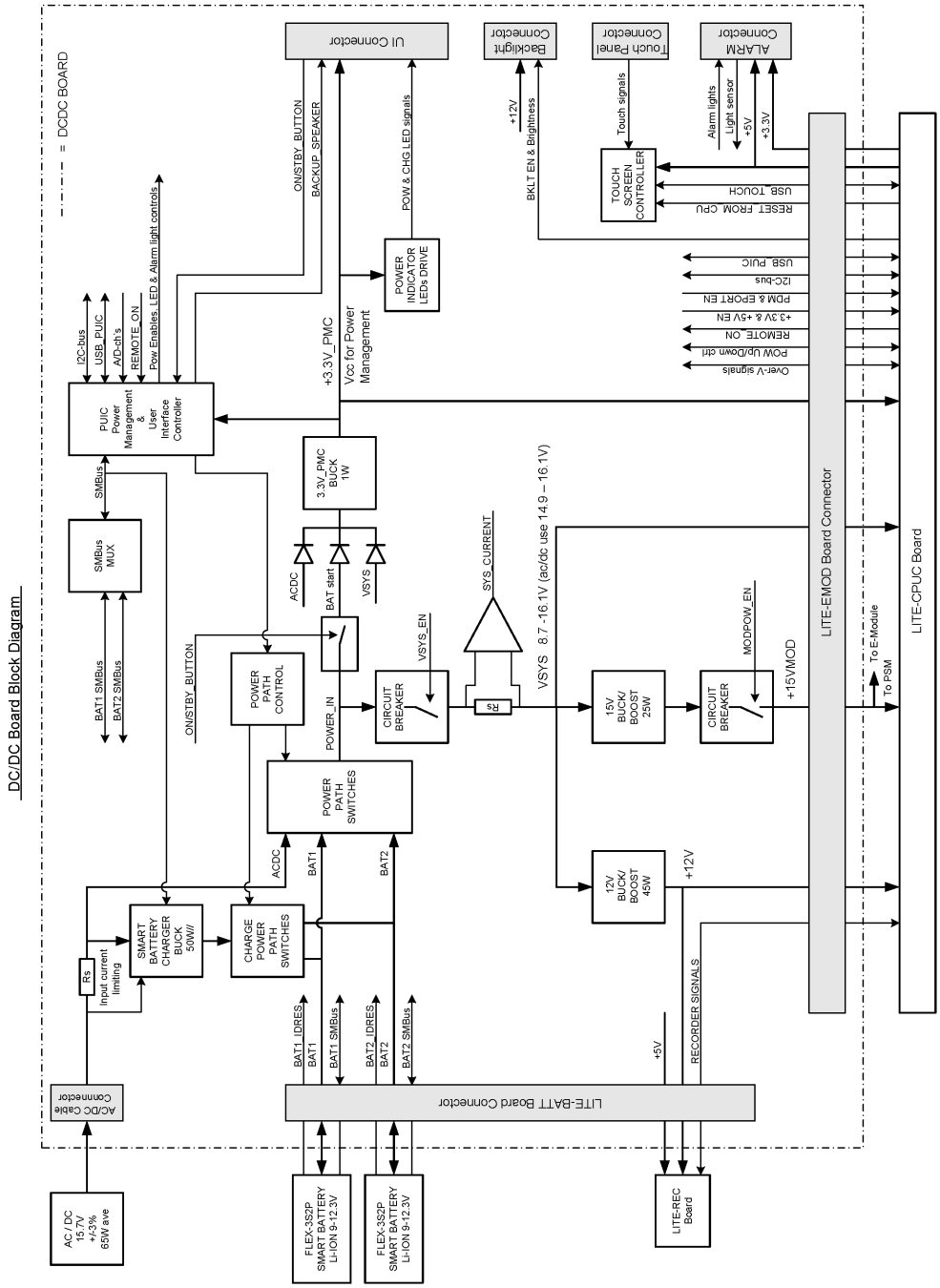


Figure 4 CARESCAPE Monitor B450 DC/DC Board Block Diagram

9.2.1 PUIC controller and software

The Power Management and User Interface Controller (PUIC) software controls the hardware related functions of the DC/DC and user interface controller subsystems.

The PUIC software is included in the host software package and upgradeable via software CD.

9.2.2 DC/DC Subsystem

The DC/DC subsystem takes care of:

- the power path control and sequencing,
- DC/DC conversions,
- smart battery management
- system supervision

Power path control and sequencing

The DC/DC subsystem takes care of controlling the power path switches. The power path switches select either AC/DC output voltage or battery voltage as the DC/DC board input source. The PUIC controller controls power supplies' sequencing.

DC/DC conversions

The DC/DC board converts the output voltage of the AC/DC power supply, or the battery voltage, to the following supply voltages:

- +12V is generated by using buck-boost converter. It is supplied to the CPU module, thermal recorder and the LED backlight converter unit in the LCD display.
- +15V is generated by using a buck-boost converter. It is supplied to the E-modules and PSM module through +15VMOD circuit breaker.
- VSYS voltage level depends on the selected power source. In battery use, the VSYS is between 8.7-12.3V and in AC/DC use the VSYS is between 14.9-16.1V. The VSYS voltage s supplied to the PDM module and to the voltage converter in the CPU Carrier Board.

All supply voltages have over-voltage and short-circuit protection.

Smart Battery Management

The PUIC controller acts as a SMBus host device and takes care of the battery management and charging.

The smart battery charger acts as a SMBus slave device that responds to charging current and charging voltage requests received via SMBus.

The PUIC controller may reduce or stop charging current if needed from the system point of view, for example, if the system power consumption or temperature would get too high. The smart battery is responsible for the charging algorithm and capacity calculation.

System supervision

The PUIC controller monitors the internal supply voltages, temperatures and power consumption of the patient monitor.

The voltages and temperatures are measured by the A/D converters and temperature sensors in the DC/DC board and CPU Carrier Board. System current is measured from the DC/DC board and used to calculate the system power consumption.

The communication between the PUIC controller and the A/D converter and temperature sensor on CPU Carrier board takes place via the I2C bus (Inter-Integrated Circuit).

9.2.3 User Interface Controller (UIC) subsystem

The User Interface Controller (UIC) subsystem manages the following user interface related functions.

Alarm light control

- PUIC controller controls the alarm light LEDs according to the information received from the CPU assembly.
- The DC/DC board passes the +3.3V and +5 V supply voltages to the alarm light board.

Ambient light sensor

- The PUIC controller digitizes the information received from the ambient light sensor and passes it to the CPU assembly.
- CPU assembly adjusts the brightness of the display according to the ambient light information received from the PUIC controller.

User interface board

- The UIC subsystem has the LED drives for three power indicator LEDs and ON/Stdby button LED in the keypad.
- The PUIC controller provides an audible power failure alarm to the buzzer in case of sudden system power loss.
- The On/Stdby button press and remote-on signal are read by the PUIC controller.

Touchscreen controller

- The touchscreen controller digitizes the user input received from the touchscreen sensor and passes the coordinate information to the CPU assembly using USB communication.

9.3 CPU assembly

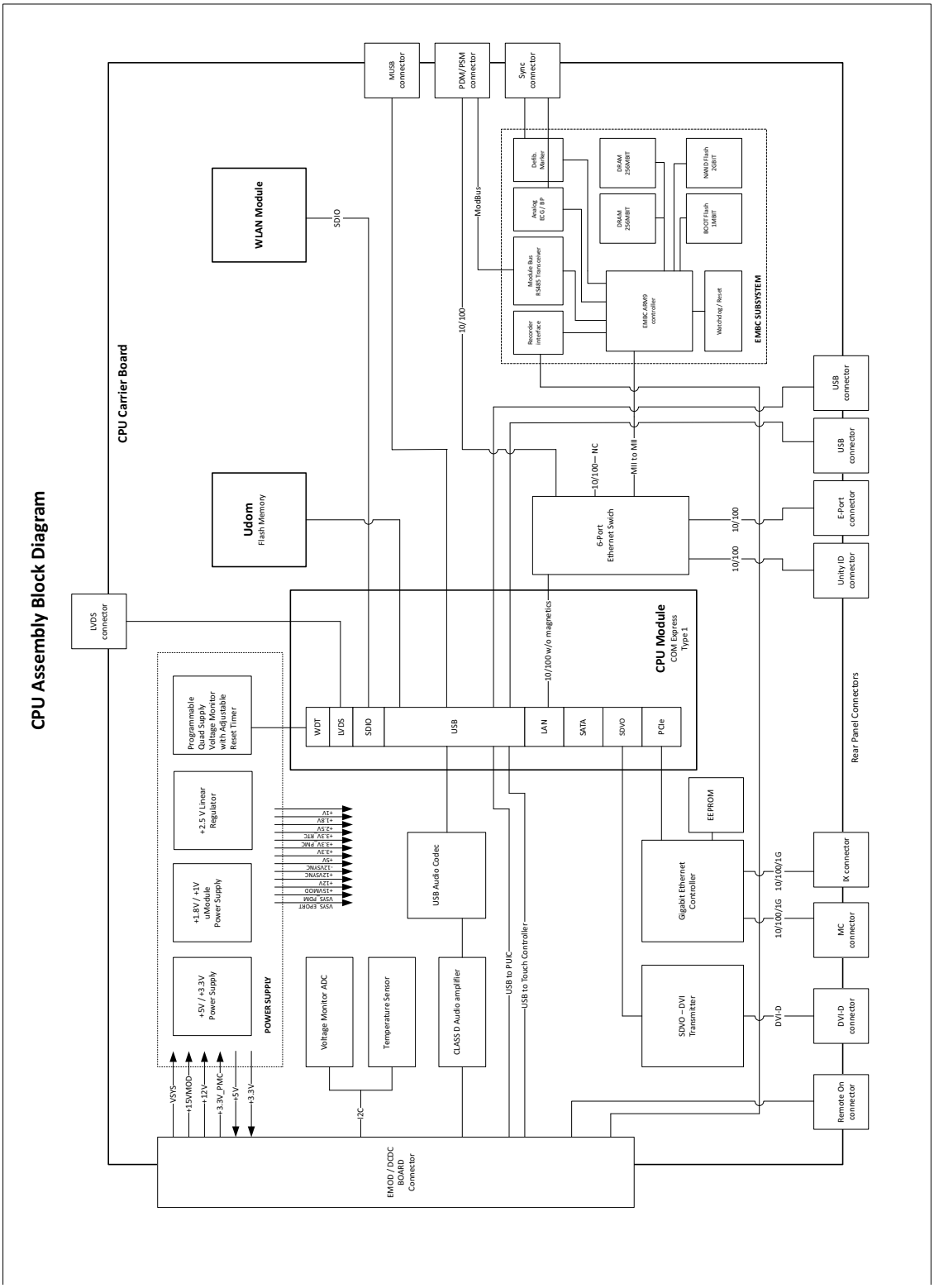


Figure 5 CARESCAPE Monitor B450 CPU board block diagram

9.3.1 CPU carrier board

DC/DC subsystem

The DC/DC subsystem takes care of the following voltage conversions.

The VSYS voltage is converted to +5V and +3.3. V supply voltages by a step-down converter:

- +5V is supplied for the external USB connectors, alarm light board, audio amplifier and for the optional WLAN module and recorder.
- +3.3V is supplied for the DC/DC board, alarm light board, CPU carrier board and LCD display.

The +5V is converted to +1.8V and +1V supply voltages by a step-down converter:

- +1.8V is supplied for the Ethernet and EMBC subsystem.
- +1V is supplied for the Ethernet subsystem.

The +3.3V is converted to +12V and -12V voltages for the direct ECG and Invasive BP analog outputs.

+5V, +3.3V, +1.8V and +1V supply voltages have over-voltage and short-circuit protection. The CPU carrier board has also the circuit breakers for the VSYS_EPORT and VSYS_PDM supply voltages.

EMBC subsystem

The Ethernet module bus controller (EMBC) section in the CPU board has its own micro controller. It has serial flash memory for the EMBC bootloader software, NAND flash for EMBC application software and Linux kernel and SDRAM to run time EMBC code execution and temporary data storage.

The EMBC section takes care of the following CPU services:

- It provides serial communication for the optional built-in recorder.
- It provides RS-485 module bus communication for the E-modules and PSM module.
- It provides analog ECG and invasive pressure outputs and a digital marker-out signal for a user-supplied equipment, for example a defibrillator or an intra-aortic balloon pump that is connected to

EMBC application software controls the EMBC related. The EMBC software is included in the host software package and upgradeable via software CD.

The EMBC section communicates with the main processor in CPU module using Ethernet communication.

Display subsystem

The display controller is integrated to the CPU Module. It provides LVDS (Low Voltage Differential Signaling) and SDVO (Serial Digital Video Out) output to the CPU Carrier Board.

The display subsystem in the CPU Carrier Board takes care of the following functions:

- It passes the LVDS signal lines and the +3.3 V supply voltage to the integrated 12.1" LCD display via the display cable.
- It has a SVDO - DVI transmitter that encodes the video signal for the external digital display that is connected to the DVI-D connector.
- It has the LED drivers for the LED backlight unit in the LCD display and controls the display brightness. The backlight cable is connected to the DC/DC board.

Ethernet subsystem

The CPU carrier board has a 5-port Ethernet switch. The interfaces provided by the Ethernet switch share the same MAC address. The Ethernet host is in the CPU module. The Ethernet switch port usage is as follows:

- PDM interface for the connector in the Module Rail Unit
- ePort interface for the connector for PDM in the rear panel
- Unity ID interface for the connector in the rear panel
- EMBC communication between CPU Module and EMBC subsystem
- Host port

The CPU carrier board has a separate Ethernet controller that provides Ethernet interface for the MC and IX connectors with a unique MAC addresses.

Audio subsystem and speaker unit

The main speaker is used to provide audible alarms.

The audio signal for the speaker is generated in the CPU carrier board using an audio codec and an audio amplifier. Audio feedback controls the operation of the speaker.

The speaker cable is connected to the E-Module board.

System supervision

- Watchdog timers control the operation of the main processor and EMBC processor software execution.
- The CPU board has battery backed-up real-time clock to store system date and time.
- An I2C A/D converter and SPI temperature sensor measure the CPU supply voltages and board temperature.

External Interfaces

The CPU carrier board provides the following external interfaces.

In the rear panel:

- 2 high speed USB connections for the USB input devices, for secondary display and for exporting monitoring data to external systems.
- 1 DVI-D connector for an external digital display.
- 3 Ethernet (RJ-45) connectors:
  - MC port for interfacing to CARESCAPE MC Network or S/5 Network.
  - IX port for interfacing to CARESCAPE IX Network.
  - ID port for interfacing to Unity ID Interface Device
- 1 ePort (DB9) connector for interfacing a remote PDM module with an ePort cable.
- 1 Remote-on connector. A remote-on cable enables an external GE device to turn on / to standby the patient monitor. The remote-on functionality is disabled when the patient monitor is battery powered.

In the side panel:

- 1 Synchronization connector. The synchronization connector provides analog ECG and invasive pressure outputs and a digital marker-out signal for external user-supplied equipment, for example a defibrillator or an intra-aortic balloon pump. This connector does not operate with the PDM module. Refer to the CARESCAPE Modular Monitors Supplemental Information Manual for details about the pin layout and electrical specifications.

The external connectors have ESD protection. RJ-45 connectors are electrically isolated by Ethernet transformers.

9.3.2 uDOM

A detachable, non-volatile flash memory, USB Disk On Module (uDOM), is used as the permanent memory for application and service software and to store clinical and platform settings. The uDOM can hold two versions of the software in different partitions: inactive and active.

9.3.3 WLAN assembly

The optional IEEE 802.11a/b/g WLAN module enables wireless network communication in the 2.4 and 5.1 GHz frequency bands. The WLAN module connects to the CPU carrier board.

The two internal dual-band antennas are attached to the rear unit assembly. WLAN connection is activated when the patient monitor is not connected to a wired network through the MC port. It shares the same MAC address with the wired MC port.

9.3.4 CPU Module

The patient module has an Intel Atom based COM Express CPU module.

The CPU module has the main processor that manages the data processing of the patient monitor and volatile SDRAM memory for run time code execution and temporary data storage.

The CPU module provides the following interfaces:

- LVDS (Low Voltage Differential Signaling) interface for the integrated LCD display and SDVO (Serial Digital Video Out) output to SDVO-DVI transmitter in the CPU Carrier Board.
- The Ethernet host controller for the Ethernet switch is in the CPU Module.
- PCIe interface for the Ethernet controller in the CPU carrier board.
- USB interface for the uDOM, audio codec, touchscreen controller and PUIC controller
- SDIO interface for the WLAN module.

9.4 Other subsystems

9.4.1 Display subsystem

Display

The patient monitor has an integrated 12.1" active matrix color TFT LCD panel with a LED backlight unit. It provides wide viewing angle and supports XGA (1024 * 768 pixels) resolution.

The video controller is integrated into the CPU board and it provides LVDS output to the LCD panel through the display cable. The display cable also supplies the +3.3 V supply voltage to the LCD panel.

LCD backlight unit

The LCD panel has an integrated, long-life LED backlight unit that is used to illuminate the LCD display. The LED backlight unit receives the +12 V input voltage from the DC/DC board via backlight cable. The backlight enable signal and brightness control is received from the CPU carrier board.

9.4.2 Touchscreen sensor

The patient monitor has a resistive touchscreen sensor in the front of the LCD panel. The touchscreen sensor detects the presence and location of a touch within the display area and communicates the information through the touchscreen cable to the touchscreen controller at/ on the DC/DC board.

9.4.3 E-Module board

The E-module board is a simple connector board. It interfaces the CPU Carrier Board to the DC/DC Board and provides a D25 male connector for one single-width E-module.

9.4.4 Alarm light board

The right hand side of the alarm light board contains red, yellow and blue LEDs to display different priority visual alarms. The left hand side of the alarm light board has blue LEDs for the silence alarm indicator light.

The alarm light board also has a separate light sensor that is capable of measuring the ambient light intensity. The ambient light feedback can be used to auto-adjust the brightness of the LED backlight of the LCD panel to the different ambient light conditions.

The alarm light board is connected to the DC/DC board with the alarm light cable.

9.4.5 Speaker Unit

The speaker unit is used to provide audible alarms. The audio signal for the speaker is generated in the CPU carrier board using an audio codec and an audio amplifier. Audio feedback controls the operation of the speaker.

The speaker cable is connected to the E-module board.

9.4.6 Keypad & Buzzer

The patient monitor has a user interface board with an on/standby button and three power indicator LEDs: mains voltage indicator, battery use indicator and battery charging/failure indicator. The user interface board is connected to the DC/DC board with a user interface cable.

The buzzer is connected to the user interface board. It functions as a back-up speaker and also provides an audible power loss alarm.

9.4.7 Recorder unit/ assembly

The optional recorder assembly consists of a 50 mm recorder and a recorder board.

The recorder board interfaces the recorder to the DC/DC board through the battery board. The recorder board provides the following main functions:

- It passes the recorder control signals and the serial communication lines to the recorder.
- It has a circuit-breaker and a LC-filter for the +12 V.
- It passes +5 V to the recorder.

The serial communication and recorder buffers are in the EMBC section of the CPU carrier board.

9.4.8 Battery board

The battery board is a simple connector board. It interfaces the two lithium-ion batteries and the optional thermal recorder to the DC/DC board.

9.4.9 Module Rail Unit

The Module Rail Unit connects to the CPU carrier board. It provides interfaces for PSM and PDM modules:

- The 10-pin PDM connector provides the VSYS PDM supply voltage and the Ethernet communication lines to the PDM module.
- The PSM connector provides the +15 VMod PSM supply voltage and the RS-485 communication lines to the PSM module.

For your notes:

10 Maintenance and checkout

This chapter specifies the checkout procedure and the maintenance activities to be performed to the patient monitor after corrective maintenance and during annual planned maintenance.

This chapter also covers the battery maintenance information for the patient monitor's lithium-ion battery.

WARNING **Only perform maintenance procedures specifically described in the manual.**

WARNING **Planned maintenance should be carried out annually. Failure to implement the recommended maintenance schedule may cause equipment failure and possible health hazards.**

NOTE: The manufacturer does not, in any manner, assume the responsibility for performing the recommended maintenance schedule, unless an Equipment Maintenance Agreement exists. The sole responsibility rests with the individuals, hospitals, or institutions utilizing the device.

NOTE: Refer to Module Frames and Modules Technical Manual for corrective and planned maintenance checkout procedures of the parameter modules.

NOTE: Refer to the PDM section in the Module Frames and Modules Technical Manual for the battery maintenance procedure of the PDM battery.

Corrective maintenance

Service personnel shall perform the following checkout procedure steps after any corrective maintenance, before taking the monitor back into clinical use:

Performed service activity	Required checkout procedure		
	Visual inspections (section 10.1)	**Electrical safety test (section 10.2)**	**Functional check (section 10.3)**
After detaching, replacing or upgrading: - Recorder unit (FRU / Upgrade)	Yes	No	- 10.3.1 Start-up - 10.3.14 Recorder
After detaching or replacing: - Module rail unit (FRU)	Yes	No	- 10.3.1 Start-up - 10.3.3 PSM / PDM identification
After detaching, replacing: - CPU battery (FRU) - Mains fuses (FRU) - Battery door (FRU) - Monitor battery (FRU)	Yes	No	- 10.3.1 Start-up
After detaching or replacing any other part inside the patient monitor.	Yes	Yes	Perform all functional check steps from 10.3.1 to 10.3.15

Planned maintenance schedule

Service personnel shall perform the following checkout procedure every 12 months after installation:

1. Visual inspection (section 10.1)
2. Electrical safety tests (section 10.2)
3. Functional check (section 10.3, all steps)
4. Battery maintenance (section 10.4)

Replace the CPU timekeeper battery every 5 years, or whenever the ***Service Monitor Error Code 0xHOST1100*** message is shown.

10.1 Visual inspection

Follow the procedure in section 8.1. Visual inspection.

10.2 Electrical safety checks

Electrical safety tests provide a method of determining if potential electrical health hazards to the patient or operator of the device exist.

Perform the following electrical safety tests described in detail in chapter 8. Installation checkout:

- 8.2.1. Test setup
- 8.2.2. Power outlet
- 8.2.3. Power cord and plug
- 8.2.4. Ground (earth) integrity
- 8.2.5. Earth leakage current test
- 8.2.6. Enclosure leakage current (touch current) test

Record the values of the tests on the Appendix B. Maintenance checkform.

10.3 Functional check

10.3.1 Start-up

Follow the procedure in section 8.3.1. Start-up.

10.3.2 Display

Follow the procedure in section 8.3.2. Display.

10.3.3 PSM / PDM identification

1. Configure the ECG1 waveform field and the NIBP parameter window to the patient monitor screen with adequate priority. Connect a PSM or PDM module to the patient monitor.
2. Verify that the ECG waveform field, the NIBP parameter window and the related information appear on the patient monitor screen.

10.3.4 E-module identification

1. Log in to Webmin.
2. Select ***Information > Device Information***.
3. Verify that the information about the connected module appears in the table named as ***"Acquisition Information – E-Modules"***.

NOTE: For some parameter modules, the table does not show the actual module information, but the information of the individual subassemblies inside the module.

NOTE: You may need to refresh the Webmin screen if you have connected the module to the patient monitor after entering the ***Device Information*** Webmin screen.

10.3.5 Keypad and remote

Follow the procedure in section 8.3.5. Keypad and remote.

10.3.6 Mouse

Follow the procedure in section 8.3.6. Mouse.

10.3.7 Alphanumeric keyboard

Follow the procedure in section 8.3.7. Alphanumeric keyboard.

10.3.8 Barcode reader

Follow the procedure in section 8.3.8. Barcode reader.

10.3.9 MC Network and S/5 Network

Follow the procedure in section 8.3.9. MC Network and S/5 Network.

10.3.10 Wireless LAN

Follow the procedure in section 8.3.10. Wireless LAN.

10.3.11 IX printers

Follow the procedure in section 8.3.11. IX printers.

10.3.12iPanel connection

Follow the procedure in section 8.3.12. iPanel connection.

10.3.13 Insite with Exc

Follow the procedure in section 8.3.13. Insite with EXC

10.3.14 Recorder

1. Select ***Monitor Setup > Printing > Devices > Setup*** and configure:
   Printout: Waveforms
   Location: Local

2. Select ***Monitor Setup > Printing > Waveforms*** and configure:
   Waveform 1: II
   Waveform 2: V1

3. Select ***Monitor Setup > Printing > Waveforms > Print Waveforms*** or the related soft key in the main menu, or the ***Print Waveforms*** hard key in the keypad to start printing.

4. Verify that the recorder starts printing. Let the recorder print for approximately 10 seconds and verify the following things from the printout:
   – The header line contains the date, time and some other applicable status and configuration information.
   – The grid is clear.
   – The waveforms labels appear in the printout as configured.

Stop printing by selecting ***Monitor Setup > Printing > Waveforms > Stop Printing***, or the related soft key in the main menu.

10.3.15 Synchronization connector test

Required Tools

– E-PSMP module
– A multiparameter patient simulator with invasive pressure adapter cable to GE invasive pressure connector.
– 5 lead ECG trunk cable, IEC or AHA
– 5 leadwire set, IEC or AHA
– Oscilloscope
– Analog output cable (2000633-001)

NOTE: You can alternatively use the GE defib sync tester, 2040582-001, together with the Analog output cable, 2000633-001 and a multiparameter simulator to perform this test. Follow

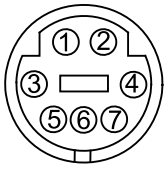
the instructions included with the tester. See analog output cable wire colors and related signals from the table below.

Connections

1. Ensure that the module is connected to the patient monitor.
2. Connect the 5-lead ECG trunk cable to the green ECG connector in the module.
3. Connect the 5-leadwire sets to the trunk cable and to the simulator.

Procedure

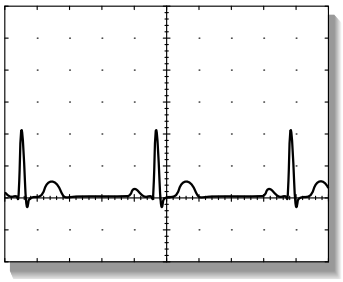
1. Use the figure and table below as a reference for connecting the oscilloscope to the defibrillator synchronization connector port, located on the left side of the patient monitor, for performing these tests.



Defibrallator Syncronization connector		**Analog output Cable (2000633-001). Related wire color in the open end of the cable *)**
Pin number	**Signal**	
1	Digital defibrillator syncronization marker out signal	Black
2	Digital defibrillator syncronization marker in signal	Green
3	Common GND	Red
4	Analog GND	Blue
5	Analog GND	White
6	IP analog output	Yellow
7	ECG analog output	Grey

*) Brown wire is not connected.

2. Test the ECG, Arterial BP, and Marker Out signals from the defibrillator synchronization connector port. They should closely resemble the waveforms in the figures below.



DEFIB Sync connector: ECG

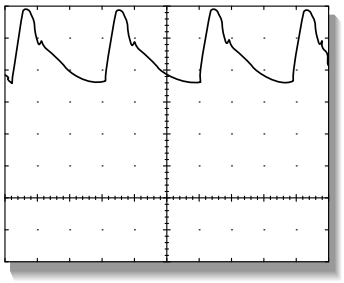
ECG analog output signal: Grey

Analog GND: Blue or White

Probe Type: x10

Time/Division: 200 mS

Volts/Division: 0.5V



DEFIB Sync connector: arterial BP

IP analog output signal: Yellow

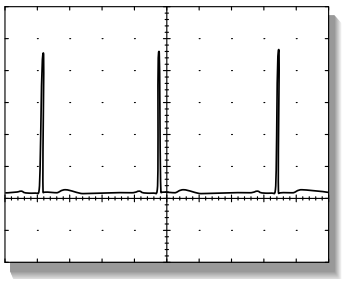
Analog GND: Blue or White

Probe Type: x10

Time/Division: 200 mS

Volts/Division: 0.2V

There are two Marker Out traces shown below. The upper Marker Out figure references the frequency aspects of the signal. The lower Marker Out figure references the pulse width aspects of the signal.



DEFIB Sync connector: Marker Out (frequency)

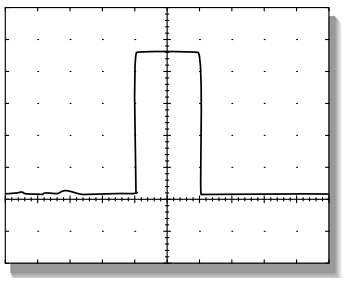
Digital defibrillator synchronization marker out signal: Black

Common GND: Red

Probe Type: x10

Time/Division: 200 mS

Volts/Division: 2V



DEFIB Sync connector: Marker Out (pulse width)

Digital defibrillator synchronization marker out signal: Black

Common GND: Red

Probe Type: x10

Time/Division: 5 mS

Volts/Division: 2V

10.3.16 Test completion

Select ***Discharge Patient*** or ***Reset Case*** to discard any changes made to the patient monitor configuration during checkout.

- Complete the Appendix B. Maintenance check form.

10.4 Monitor battery maintenance

The lithium-ion (Li-Ion) battery is a rechargeable battery containing lithium-ion cells. Each battery contains an integrated electronic fuel gauge and a safety protection circuit.

The following are facts about lithium-ion battery technology:

- The battery discharges on its own, even when it is not installed in the equipment. This discharge is the result of the lithium-ion cells and the bias current required for the integrated electronics.
- The capacity loss of the battery degrades significantly at higher temperatures.
- As the battery ages, the full-charge capacity of the battery degrades and is permanently lost. As a result, the amount of charge that is stored and available for use is reduced.

The following terms are used to define the battery capacity:

- Design capacity — The theoretical capacity of the battery cells when the battery is new.
- Full-charge capacity — The actual amount of charge the battery can store and deliver.
- Remaining charge capacity — The amount of full-charge capacity currently remaining in the battery. This is a percent of full-charge capacity.

10.4.1 Use recommendations

GE recommends the following methods to improve battery performance:

- Location — Position the equipment in a location that does not artificially increase the operating temperature of the batteries.
- Conditioning guideline — Condition the battery when a ***Condition Battery A*** or ***Condition Battery B*** message is shown on the monitor screen. The condition cycle recalibrates the electronic fuel gauge.

10.4.2 Storage recommendations

GE recommends storing the battery outside of the device at a temperature between 20°C to 25°C (68°F to 77°F).

10.4.3 Testing the battery charge

Before installing a battery, verify the battery's state of charge. Press the green **TEST** button on the battery. The number of charge level indicator LEDs that illuminate indicates the approximate charge remaining in the battery.

- Four LEDs illuminated: 75% – 100% of full-charge capacity.
- Three LEDs illuminated: 50% – 74.9% of full-charge capacity.
- Two LEDs illuminated: 25% – 49.9% of full-charge capacity.
- One LED illuminated: 10% – 24.9% of full-charge capacity.
- One LED flashing: < 10% of full-charge capacity remaining.

10.4.4 Charging a battery

The battery is charged whenever it is installed into the patient monitor and the patient monitor is connected to an AC power source. The battery is charging both when the patient monitor is turned on and when it is in the standby mode.

Battery is charging as long as the orange battery charging LED indicator is lit.

To check the battery charge status, select ***Monitor Setup > Battery Status > Advanced***.

10.4.5 Conditioning a battery

Condition the battery when a ***Condition Battery A*** or ***Condition Battery B*** message is shown on the monitor screen. The condition cycle recalibrates the electronic fuel gauge.

Condition the battery by fully discharging and recharging the battery twice according to the following procedure:

NOTE: The patient monitor must be in a discharged state during battery conditioning. Disconnect any acquisition modules from the patient monitor if connected.

1. Turn on the patient monitor. Disconnect the power cord from the wall outlet. Leave the patient monitor on until the battery is fully discharged and the patient monitor turns off automatically.

NOTE: Ignore the ***Monitor Battery Low*** and ***Monitor Battery Empty!*** messages when discharging the battery.

2. Reconnect the power cord to the wall outlet and turn on the patient monitor. Leave the patient monitor on until the battery is fully recharged and the orange battery charging indicator LED turns off.
3. Repeat the steps 1 and 2 once.

The battery is now conditioned and ready for use. However if either ***Condition Battery A*** or ***Condition Battery B*** message is still shown on the patient monitor screen, repeat the conditioning cycle once more. If the problem persists, replace the battery.

NOTE: Refer to section 11.6. Battery diagnostics and 11.7. Error messages and codes for more detailed information about the battery status and operating condition.

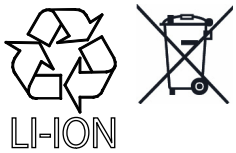
10.4.6 Replacing a battery

Replace the battery in the following situations:

– if either ***Replace battery A*** or ***Replace battery B*** message is displayed. This message indicates that the full-charge capacity of the used battery has considerably degraded compared to the design capacity of a new battery.

– if either ***Battery A failure*** or ***Battery B failure*** message is displayed.

Remove the battery from the patient monitor and install a new battery according to the battery installation instructions in the Hardware Installation section



NOTE: Dispose of the battery according to local, state or country laws.

NOTE: Refer to the section 11.6. Battery diagnostics and 11.7. Error messages and codes for more detailed information about the battery status and operating condition.

NOTE: Refer to the Troubleshooting chapter for more detailed information about the battery diagnostics and error messages.

WARNING **Do not incinerate a battery or store at high temperatures. Serious injury or death could result.**

11 Troubleshooting

The problems and solutions in this section represent only a few of the faults that you may encounter and are not intended to cover every possible problem that may occur.

This chapter focuses on troubleshooting technical problems. See the patient monitor's user's manual for troubleshooting monitoring problems and clinical configuration issues.

If the problem remains, call technical support for service. To ensure accurate problem solving, please be prepared to provide the following information:

- Problem description and the troubleshooting done so far.
- Configuration information (section 11.2.1)
- Device information (section 11.2.2)
- Service Logs (section 11.3.4)
- Error messages displayed, if any.
- Other information, as requested.

11.1 Visual inspection

Before beginning any detailed troubleshooting, complete a thorough visual inspection to be sure that:

- There is no physical damage.
- All peripheral devices are connected properly.
- The patient monitor and the connected peripheral devices are properly powered.

Also verify that the problem is not caused because of:

1. Incompatibility issue. See the patient monitor's supplemental information manual for the list of compatible devices.
2. Incorrect platform or clinical configuration. Refer to the chapter 7. Configuration in this manual for details about platform configuration and the patient monitor's user's manual for details about clinical configuration.

If loose parts or cable connections inside the patient monitor are suspected, disassemble the patient monitor to a level needed to perform an internal visual check. Check that:

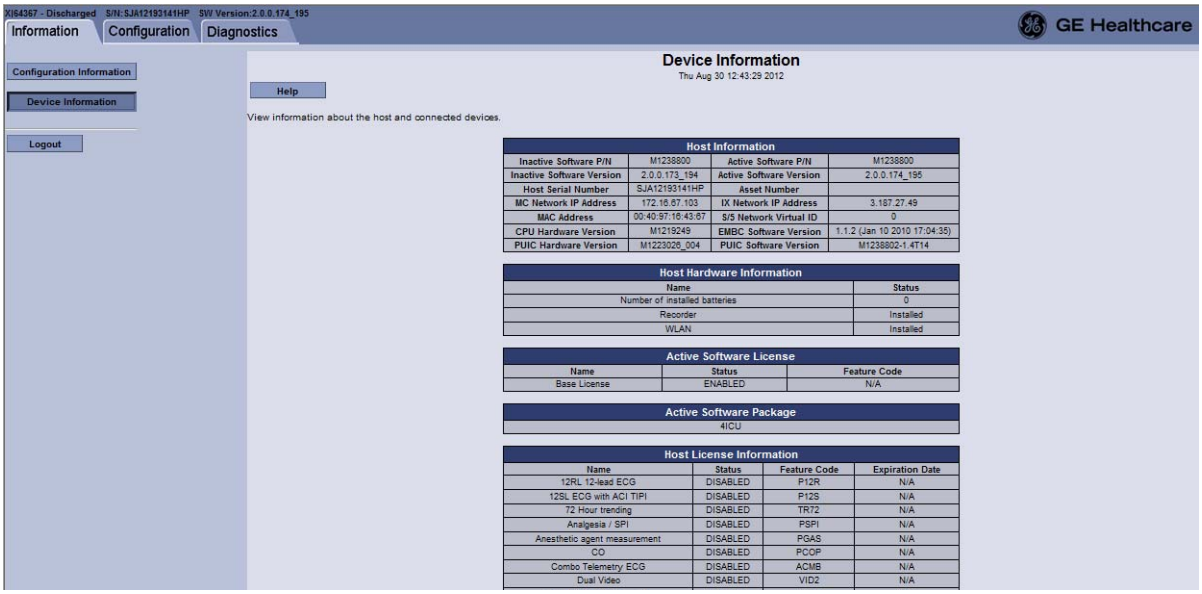
- all screws are tightened properly
- all cables are connected properly
- there are no loose objects inside the patient monitor

NOTE: Perform the electrical safety test and the checkout procedure every time you have disassembled the patient monitor.

11.2 Webmin - Information tab

Access Webmin service interface to view configuration information and device information.

.


XI64367 - Discharged S/N:SJA12193141HP SW Version:2.0.0.174_195
Information
Configuration
Diagnostics
GE Healthcare
Configuration Information
Device Information
Logout
Device Information
Thu Aug 30 12:43:29 2012
Help
View information about the host and connected devices.
Host Information
Inactive Software P/N M1238800 Active Software P/N M1238800
Inactive Software Version 2.0.0.173_194 Active Software Version 2.0.0.174_195
Host Serial Number SJA12193141HP Asset Number
MC Network IP Address 172.16.67.103 IX Network IP Address 3.187.27.49
MAC Address 00:40:97:16:43:67 S/5 Network Virtual ID 0
CPU Hardware Version M1219249 EMBC Software Version 1.1.2 (Jan 10 2010 17:04:35)
PUIC Hardware Version M1223026_004 PUIC Software Version M1238802-1.4T14
Host Hardware Information
Name Status
Number of installed batteries 0
Recorder Installed
WLAN Installed
Active Software License
Name Status Feature Code
Base License ENABLED N/A
Active Software Package
4ICU
Host License Information
Name Status Feature Code Expiration Date
12RL 12-lead ECG DISABLED P12R N/A
12SL ECG with ACI TIPI DISABLED P12S N/A
72 Hour trending DISABLED TR72 N/A
Analgesia / SPI DISABLED PSPI N/A
Anesthetic agent measurement DISABLED PGAS N/A
CO DISABLED PCOP N/A
Combo Telemetry ECG DISABLED ACMB N/A
Dual Video DISABLED VID2 N/A

11.2.1 Configuration information

The Configuration Information module shows the current platform configuration of the patient monitor and the connected peripheral devices.

To view configuration information:

1. Log in to the Webmin.
2. Select the ***Information*** tab.
3. Select ***Configuration Information***.
4. Scroll down the page to view the configuration information:

Configuration information	
Host Information	• Active software part number and version, Inactive software part number and version, Host serial number, Host asset number, MC Network IP address, IX Network IP address, MAC address, S/5 Network virtual ID, CPU hardware version, EMBC software version, PUIC software version and DC/DC hardware version.
Host Hardware Information	• Status information for the number of installed batteries, recorder and WLAN options.
PDM License Information	• PDM license option, status, and number of licenses.
Active Software License	• Current monitor software license in use, status and feature code.
Active Software Package	• Current software package in use.
Host License Information	• Each host license name, its current status (enabled, disabled or trial), feature code, and the expiration date for a trial license.

Configuration information	
Default Clinical Settings	• Current default clinical settings.
Admit Settings	• Patient ID Prefix.
Citrix	• Server address, initial program, session timeout in minutes, username and encryption level.
Unit and Bed Name	• Unit name and Bed name for CARESCAPE Network.
E-Module Information	• STP/TP/ST configuration information and P/PT/PP configuration information from E- modules.
S/5 Printers	• Printer name.
IX Printers	• Printer name, hostname or IP address.
Printer Location Information	• Printout type (Alarm Waveforms, Numeric Trends, Reports, and Waveforms) and Printer location.
Remote Service	• Proxy URL, Proxy port, Proxy username, Remote service status, System ID, Serial number, Enterprises URL, Enterprises tunnel URL, and Protocol.
Language	• Clinical user interface language.
National Requirement	• Setting for country specific alarms (None or France).
Network	• Active configuration information, including MAC address, MC Network type (IP address, Netmask, Gateway, Destination IP address, Destination netmask, and PHY configuration), and IX Network type (IP address, Netmask, Gateway, DNS server 1, DNS server 2, and PHY configuration).
Power Line Frequency	• Current power line frequency setting in use.
MUSE/12SL	• Location ID, Site number, MUSE web username, and MUSE web URL.
WLAN	• Wireless LAN configuration information, including WLAN radio status, Antenna Diversity, Region, Frequency Band, RTS Threshold, Fragmentation Threshold, Applied QoS Standard, WMM AC Parameters (for Voice, Video, Best Effort, and Background), DSCP Settings (for Realtime Clinical Traffic, Non-Realtime Clinical Traffic, and Non-Realtime Non-Clinical Traffic), SSID, Authentication method, Confidentiality method, and Key Index.

11.2.2 Device information

The Device Information module shows the hardware and software information of the patient monitor and the connected peripheral devices.

To view Device information:

1. Log in to the Webmin.

2. Select the ***Information*** tab.
3. Select ***Device Information***.
4. Scroll down the page to view the device information:

Device information	
Host Information	• Active software part number and version, Inactive software part number and version, Host serial number, Host asset number, MC Network IP address, IX Network IP address, MAC address, S/5 Network virtual ID, CPU hardware version, EMBC software version, PUIC software version and DC/DC hardware version.
Host Hardware Information	• Status information for the number of installed batteries, recorder and WLAN options.
Active Software License	• Current monitor software license in use, status and feature code.
Active Software Package	• Current software package in use, status and feature code.
Host License Information	• Each host license name, its current status (enabled, disabled or trial), feature code, and the expiration date for a trial license.
Acquisition Information - PDM	• Active software version, Main board revision, DAS board revision, Serial number, Asset number, MAC address, IP address, Power frequency, ECG filter.
Acquisition Information - E-Module	• Label, Software version, Control number, and Serial number.
Installed S/5 Printers	• Printer name.
Installed IX Printers	• Printer name, hostname or IP address.
Printer Location Information	• Printout type (Alarm Waveforms, Numeric Trends, Reports, and Waveforms) and Printer location.
PDM License Information	• PDM license option, status, and number of licenses.
UNITY ID Information	• Product ID, Unity Network ID software number and version, Date, Time, Device name and software version of each device connected.
USB Port Information	• Product name, Manufacturer, Vendor code, Product ID, and Serial number.

11.3 Webmin - Diagnostics tab

Access Webmin service interface to view hardware statistics, ping a network device, view WLAN diagnostics and view or download log files.

11.3.1 Hardware statistics

DCDC Board			
Measurement	**Current Reading**	**Lower Limit**	**Upper Limit**
ACDC voltage (in mV)	15740	14000	17000
BAT1 voltage (in mV)	12108	9000	12600
BAT2 voltage (in mV)	12125	9000	12600
VSYS voltage (in mV)	15680	8800	17000
+12V voltage (in mV)	12060	11500	13500
+15V voltage (in mV)	15010	13000	17000
+5V voltage (in mV)	5020	4600	5500
+3.3V voltage (in mV)	3320	3000	3600
System power (in mW)	14840	1000	110000
DCDC temperature (in C)	36.70	10	62

CPU Carrier Board			
Measurement	**Current Reading**	**Lower Limit**	**Upper Limit**
+12Vsync CPU Voltage (in mV)	12000	11000	13000
-12Vsync CPU Voltage (in mV)	-11950	-13000	-11000
+15V MOD voltage (in mV)	14980	13000	17000
VSYS (in mV)	15610	8800	17000
VSYS_EPORT (in mV)	--		
VSYS_PDM (in mV)	--		
CPU Carrier temperature (in C)	40.00	10	65

CPU Module			
Measurement	**Current Reading**	**Lower Limit**	**Upper Limit**
CPU Module temperature (in C)	40.00	10	65

The Hardware Statistics module displays several internal voltages, temperatures and power consumption. A value is displayed in red, if the current reading exceeds a pre-determined lower or upper limit, A value is displayed either as “0” or as “--”, if it cannot be measured.

To access hardware statistics:

1. Log in to Webmin.
2. Select ***Diagnostics > Hardware Stats***.
3. Scroll down the page to view the following device information:

The controlled parameters are measured with A/D converters and temperature sensors in the specified subsystem. The measured values are then communicated over the I2C bus to the power management controller in the DC/DC board for processing, except for CPU voltages, which are both measured and processed by the CPU carrier board.

DC/DC Board	
Measurement	**Description**
AC/DC voltage (mV)	The AC/DC voltage is generated by the AC/DC power supply unit and supplied as an input voltage to the DC/DC board. The voltage is measured from the DC/DC board. The AC/DC voltage is "0", if the patient monitor is not connected to the AC mains. Also see section 11.4. Power management LEDs.
BAT1 voltage (mV) BAT2 voltage (mV)	These voltages are generated by the monitor batteries and supplied as input voltages to the DC/DC board. These voltages are measured by the A/D converter in the DC/DC board. The BATx voltage is "0", if a battery is not connected to the patient monitor. Also see section 8.4.1. Power management LEDs. See ***Monitor Setup > Battery Status > Monitor > Advanced Battery Data*** for more detailed information about the battery.
VSYS voltage (mV) +12V voltage (mV) +15V voltage (mV)	These voltages are generated by the voltage converters in the DC/DC board. These voltages supply power to the following subsystems: • VSYS (+9V...16V) is supplied for the PDM module or ePort. • +12V is supplied for the CPU module, display backlight and the optional recorder. • +15V is supplied for the E-modules and PSM module when +15VMOD circuit breaker is enabled. These voltages are measured by the A/D converter in the DC/DC board. Also see section 8.4.1. Power management LEDs.
+5V voltage (mV) +3.3V voltage (mV)	These voltages are generated by the step-down converters in the CPU carrier board. These voltages supply power to the following subsystems: • +5V is supplied for the external USB boards, Alarm Light board, audio amplifier and for the optional WLAN module and recorder. • +3.3V is supplied for the DC/DC board, CPU Carrier board, LCD display and Alarm Light board. These voltages are measured by the A/D converter in the DC/DC board. Also see section 8.4.1. Power management LEDs.

DC/DC Board	
Measurement	**Description**
System power (mW)	System power is the total power consumption of the patient monitor. Power consumption is measured from the DC/DC board.
DC/DC temperature (°C)	The internal temperature of the patient monitor measured by the temperature sensor in the DC/DC board.

CPU Carrier Board	
Measurement	**Description**
+ 12 Vsync CPU Voltage (in mV) - 12 Vsync CPU Voltage (in mV)	These voltages are generated for the ECG and Invasive pressure analog outputs and marker-out synchronization pulse. The voltages are measured by the A/D converter in the CPU Carrier board.
+15V MOD voltage (mV)	This voltage is generated by the voltage converter in the DC/DC board. It supplies power to the E-module. The voltages are measured by the A/D converter in the CPU carrier board.
VSYS (mV)	This voltage is generated by the voltage converter in the DC/DC board. It is measured by the A/D converter in the CPU carrier board.
VSYS_EPORT (mV)	The VSYS_EPORT voltage is supplied for a PDM module that is connected to the ePort connector DB9) in the rear of the patient monitor. It is measured by the A/D converter in the CPU carrier board. The value is shown as "--" if PDM module is not connected, or if VSYS_PDM voltage is enabled.
VSYS_PDM (mV)	The VSYS_PDM voltage is supplied for a PDM module that is connected to the PDM connector in the module rail unit. It is measured by the A/D converter in the CPU carrier board. The value is shown as "--" if PDM module is not connected, or if VSYS_EPORT voltage is enabled.
CPU carrier temperature (°C)	The internal temperature of the patient monitor measured by the temperature sensor in the CPU carrier board.

CPU Module	
Measurement	**Description**
CPU module temperature (°C)	The internal temperature of the patient monitor measured by the temperature sensor in the CPU module.

11.3.2 Ping a TCP/IP network device

Use this Webmin feature to verify connectivity with a network device on the MC Network and IX Network.

1. Log in to Webmin.
2. Select ***Diagnostics > Ping***.
3. In the ***Address to Ping*** field in the Ping Command window, type the IP address of a known device on the network and select ping.

If you receive a reply, then you are able to connect to the device.

If you do not receive a reply, make sure that the patient monitor is connected to an active network.

The patient monitor withstands a maximum packet loss of 5 packets per 1 million and maximum latency of 250 ms without performance degradation.

11.3.3 WLAN diagnostics

Use this Webmin feature for troubleshooting WLAN related problems. This Webmin module provides information about the WLAN driver, WLAN status and the detected access points.

1. Log in to Webmin.
2. Select ***Diagnostics > WLAN***.
3. Scroll down the page to view the following WLAN diagnostics information.

Log	Contents
WLAN Driver	• Driver API Version • Driver Version • Firmware Version • MAC Address

Log	Contents
WLAN Status	• WLAN radio • WLAN client IP Address • Antenna diversity mode • Region mode • Center frequency (i.e., the current actual center frequency, which is associated with the operating channel number used, e.g in the 2.4 GHz band on channel 6, the displayed frequency should be 2.437 GHz.) • RTS Threshold • Fragmentation Threshold • Quality of Service: - Applied QoS standard (i.e., None or WMM) - QoS parameters (CWmin, CWmax, AIFS and TXOP) for each QoS access category (Voice, Video, Best Effort, Background) • The DSCP settings for network traffic types (Realtime Clinical Traffic, Non-Realtime Clinical Traffic, Non-Realtime Non-Clinical Traffic) • SSID (i.e., Service Set Identifier / network name) • Security status: - Authentication method (i.e., open) - Confidentiality method (i.e., None, WEP-64, WEP-128, WPA-PSK (TKIP), WPA2-PSK (AES-CCMP)) - Used Key Index (if WEP-64 or WEP-128 is used) • RF readings from the WLAN radio: - Operating channel - Transmit rate in Mbps - Transmit power in mW - Signal Level (RSSI) in terms of dBm. The minimum RSSI should be -60dBm +/-5dB @ 54Mbps or greater to maintain application performance. - Noise floor in dBm - Signal to Noise Ratio (SNR) in dB

<table>
<tr><th>Log</th><th>Contents</th></tr>
<tr><td rowspan="2">WLAN status</td><td>
• The current Association/Authentication status of the WLAN Radio:
<table>
<tr><td>Association/ Authentication state</td><td>Description of the state</td></tr>
<tr><td>Disconnected</td><td>The WLAN client radio is not authenticated or associated to any network infrastructure.</td></tr>
<tr><td>Authenticating</td><td>The network infrastructure is authenticating the WLAN client radio.</td></tr>
<tr><td>Authenticated</td><td>The WLAN client radio is authenticated but not yet associated to the network infrastructure.</td></tr>
<tr><td>Associating</td><td>The WLAN client radio is in the process of associating to the network infrastructure.</td></tr>
<tr><td>Connected</td><td>The WLAN client radio is connected to the network infrastructure and data is now being transmitted.</td></tr>
</table>
- Associated AP (BSSID) (i.e., the MAC Address of associated Access Point)
</td></tr>
<tr><td>
WLAN Radio transmission information:
• Packets received
• Packets transmitted
• Bytes received
• Bytes transmitted
• Receiving errors
• Transmission errors
</td></tr>
<tr><td>Detected access points</td><td>
The following information on maximum 8 detected Access Points on the same network (same SSID) is displayed:
• Signal Level (RSSI) in terms of dBm. Signal Level (RSSI) in terms of dBm. The minimum RSSI should be -60dBm +/-5dB @ 54Mbps or greater to maintain application performance.
• Operating channel number
• MAC Address
</td></tr>
</table>

11.3.4 Log files

The patient monitor collects information about different system events and errors to log files. These log files help troubleshooting problems in the patient monitor and the connected peripheral devices.

The following table describes the available log files and the type of information that they collect.

Log file name	Contents
Webmin Action log	• Webmin user authentication and access related information (e.g., who accessed Webmin and when). • Webmin module settings changes (e.g., what was changed and when). • Software transfer history information, including the type and version of the transferred software, the origin and destination, and the date and time the software transfer occurred. • Host software activation information, including the host type and serial number, the type and version of the activated host software, and the date and time the host software activation occurred. • Module software activation information, including the module type and serial number, the type and version of the activated module software, and the date and time the module software activation occurred. • Settings transfer history information, including the type of the transferred settings, the origin and destination, and the date and time the settings transfer occurred. • Log file transfer history information, including the type of log that was transferred, the origin and destination, and the date and time the log file transfer occurred. • Webmin related error messages (e.g., information about EPI layer issues detected by Webmin).
EMBC Frame logs	• Date and time when the EMBC log was last updated. • Modbus 0, 1, 2, and 3 information, including the following: - System information (e.g., Sysinfo -packet) - Log information (e.g., Loginfo -packet) - Module node connection/disconnection information (e.g., Module Node Log) - Module slot information (e.g., addresses and times in the latest modbus frame) - Modbus frame statistics (e.g., total number of frames, number of synchronization errors, number of lost frames, number of unknown frames)

Log file name	Contents
PDM log	All PDM errors and messages.
System log	• OS events and errors, including operating system related information, such as clinical application startup and recovery information, power on self-test results, etc. • PUIC, PMC, WLAN and battery events and errors. • InSite with ExC events and errors, including InSite with ExC agent related information.
Clinical log	• Clinical-related application events, including module (parameter) connections/disconnections, case starts/ends, cold starts, warm starts, etc. • Technical notes and errors displayed for clinical users, including all host and module related technical errors (e.g., 'Failure in Agent ID'). • Clinical alarms, including clinical application related patient alarms and their level (e.g., 'FiO_2 Low'). • Clinical user interactions, such as the host keystrokes and touchscreen selections, menu setting changes, etc. • EPI layer related errors, including information about EPI layer issues detected by the clinical application. • Host serial number and active software versions.

To download log files:

1. Log in to Webmin.
2. Select ***Diagnostics > Download Logs***.
3. Select the log(s) you want to download.
4. Select ***Download***.
5. According to your Webmin access:

a. If you are using Webmin on a service PC, you can save the log file to any storage device connected to the service PC:
   - In the ***File Download*** dialog box, select ***Save***.
   - In the ***Save as*** dialog box, select the destination drive and folder and select ***Save***.

NOTE: You may change the default filename, but do not change the file extension.

b. If you are using Webmin locally through the integrated browser, you can save the settings file to a USB flash drive that is connected to one of the patient monitor's USB ports:
   - The ***Download Logs*** window will show you the name of the created log file.
   - Select ***Download*** to save the log file to the USB flash drive.

NOTE: Do not disconnect the USB storage device until downloading is complete.

6. Send this log file to GE Service for further investigation.

To view log files:

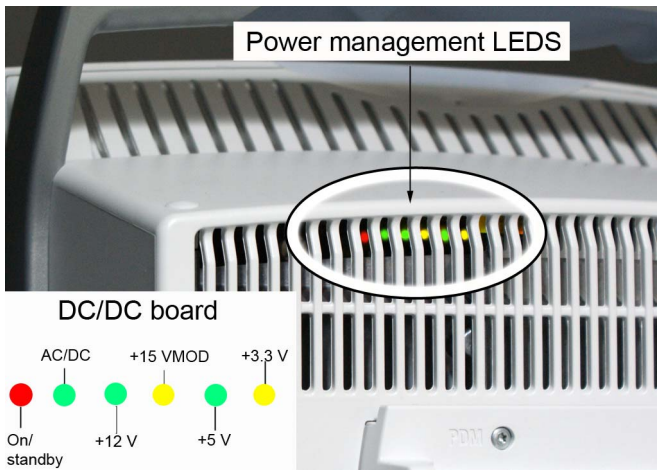
1. Log in to Webmin.
2. Select ***Diagnostics*** > ***View Logfiles***.

3. Select the log file you want to view.
4. Select the information you want to view.
   - For the Webmin Action Log, select the user, module, and timeframe and select ***Search***.
   - For the other types of logs, select the link associated with the information you want to view.

11.4 Power management LEDs

The DC/DC board includes troubleshooting LEDs that helps the user to troubleshoot start-up related problems in the patient monitor.

The troubleshooting LEDs in the DC/DC board are visible through the ventilation holes in the rear of the patient monitor (see picture below).

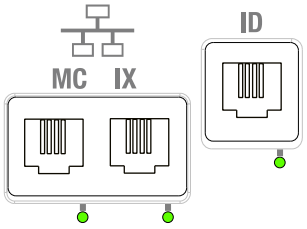


LED	Description
On/standby (red, H6)	The red on/standby LED should be lit momentarily when the on/standby button is pressed. A lit LED normally indicates that the DC/DC power supply board recognizes that the user has pressed the on/standby button and should turn the patient monitor On/Off. If the On/standby LED is not lit when the on/standby button is pressed, check the patient monitor for any of the following problems: • Faulty user interface board. • User interface cable is not connected to DC/DC board. • Faulty DC/DC board.

LED	Description
ACDC (green, H7)	The green ACDC LED should be lit when the patient monitor is connected to the AC mains, even if the patient monitor is in standby mode. A lit LED indicates that the DC/DC board receives the 15.2-16.2 VDC from the AC/DC power supply unit. If the ACDC LED is not lit when the patient monitor is connected to live AC mains, check the patient monitor for one of the problems: • Main fuses are blown. • AC/DC cable is disconnected from DC/DC board. • Faulty AC/DC power supply unit (especially, if the patient monitor operates normally when it is battery powered). • Faulty DC/DC board (especially if the patient monitor does not operate neither on AC mains nor battery).
+ 12 V (green, H3) + 15 VMOD (yellow, H5)	These secondary voltages are created by the DC/DC board and they should be lit when the patient monitor is turned On and operates normally. If one of the secondary voltages is not present (LED not lit) when the patient monitor is turned On, the DC/DC board is most likely faulty. If +15VMOD LED is not lit it may be because DC/DC board has not got a request from CPU via communication to enable +15VMOD circuit breaker as such.
+ 5 V (green, H4) + 3.3 V (yellow, H2)	These secondary voltages are created by the CPU carrier board and routed to the DC/DC board. They should be lit when the patient monitor is turned On and operates normally. If one of the secondary voltages is not present (LED not lit) when the patient monitor is turned On, the CPU carrier board is most likely faulty.

11.5 Network status LEDs

The network status LEDs help in troubleshooting network connectivity and communication problems. These LEDs are located next to each network connector in the rear of the patient monitor.



A green dual purpose LED (link & activity) for each network connector

There is one dual purpose indicator LED for each network connector:

- The LED is lit to indicate a Link, i.e., the patient monitor is physically connected to a network.
- The LED is flashing to indicate Activity, i.e., the patient monitor is either transmitting or receiving data packets over the network.

11.6 Battery diagnostics

You can check the monitor battery status from the ***Battery Status*** menu.

1. Select ***Monitor Setup > Battery Status***
   The ***Monitor Battery Status*** menu will open.

   The information is shown separately for each battery, ***A*** and ***B.***

Field	Status	Description
Time to empty (hh:mm)	hh:mm	Estimated operating time before the battery is empty.
	N/A	Battery is not connected to the patient monitor or battery is being charged.
Charge Level (%)	XX	Battery charge level compared to full capacity (in percentage).
	N/A	Battery is not connected to the patient monitor.
Slot status	"No battery"	Battery is not connected to the patient monitor.
	"No communication"	Battery is connected to the patient monitor, but battery communication failure error condition is on.
	"Failure"	Battery error condition is on.
	"Discharging"	Patient monitor is operating on battery power.
	"Charging"	Patient monitor is connected to AC mains and charging the battery.
	"Full"	Patient monitor is connected to AC mains and battery is fully charged.
Time to full (hh:mm)	hh:mm	Estimated time to charge the battery to full capacity.
	N/A	Battery is not connected to the patient monitor or battery is being discharged.
Temperature	"OK"	Battery temperature is ok.
	"Over temperature"	Battery temperature error due to high battery temperature.
	"N/A"	Battery is not connected to the patient monitor.
Battery Quality	"OK"	The full capacity of the battery is more than 50% compared to the full capacity of a new battery.
	"Condition"	Battery requires conditioning.
	"Replace"	The full capacity of the battery is less than or equal to 50% compared to the full capacity of a new battery.
	"N/A"	Battery is not connected to the patient monitor.

2. For more detailed information, select ***Advanced*** tab.

Field	Description
Remaining capacity (mAh)	Remaining capacity of the battery in mAh.
Full capacity (mAh)	Full capacity of the battery in mAh.
Full capacity compared to new (%)	Full capacity of the battery compared to the nominal full capacity of a new battery.
Cycle count	The total count of charging and discharging cycles of the battery.
Voltage (V)	Battery voltage.
Current (mA)	Battery current. Positive when charging, negative when discharging.
Temperature (°C or °F)	Battery temperature.

NOTE: Refer to the Module Frames and Modules Technical Manual for information about PDM battery.

11.7 Error messages and codes

The following error messages display in the message field if there is a problem with the patient monitor.

Refer to the patient monitor's user's manual for a complete list of system messages. Refer to Module Frames and Modules Technical Manual for a list of parameter module specific error messages.

Message	Possible causes	Possible solutions
License expired	A trial license has expired.	Enable the license with a new activation code, if needed.
Configuration changes. Restart required	Pending configuration changes to platform settings that require patient monitor restart.	Power cycle the patient monitor.
Network down	No other network device observed on the MC Network.	Verify that the patient monitor is connected to an active network.
Identical unit & bed name noticed	A patient monitor with the identical unit and bed name is on the network.	Disconnect the patient monitor that has the identical unit and bed name. or Change the unit and bed name of the duplicate patient monitor unit and bed name.

Message	Possible causes	Possible solutions
Identical IP address noticed	A patient monitor with the identical IP address is on the network.	Disconnect the patient monitor that has the identical IP address. or Change the IP address of the patient monitor that has the duplicate IP address.
Service Monitor Error Code 0xHOST1001	One of the internal temperature sensors indicate the inside temperature of the patient monitor is out of specification. The message stays on screen as long as the error condition is valid.	If temperature is too high: 1. Turn off the patient monitor. 2. Let the patient monitor cool down. 3. Check that the ventilation holes are not obstructed. 4. Ensure that the patient monitor is installed to a location that meets the specified environmental requirements of operating temperature. 5. Investigate the patient monitor thoroughly for potential short circuits and other electrical faults. 6. If possible, log in to Webmin and select ***Diagnostics> Hardware Stats*** to identify the root cause for the error message. If temperature is too low (or high): If the patient monitor has been transported or stored outside the operating temperature range, allow it to stabilize back to operating temperature range before applying power.
Service Monitor Error Code 0xHOST1002	One of the internal supply voltages is out of the specification. The message stays on screen as long as the condition is valid.	Log in Webmin and select ***Diagnostics > Hardware Stats*** to identify the supply voltage that is below or above the specification limit.
Service Monitor Error Code 0xHOST1004	Disk usage exceeds 90%.	1. Back up the clinical and platform settings and print the licensing information page via Webmin. 2. Re-install software.
Service Monitor Error Code 0xHOST1100	The CPU timekeeper battery needs to be replaced.	Replace the CPU timekeeper battery.

Message	Possible causes	Possible solutions
External alarm light disconnect. Check USB connection.	1. The USB cable between the patient monitor and the secondary display is disconnected when the patient monitor is on.	1. Reconnect the USB cable.
	2. Secondary display turned to standby when the patient monitor is on.	2. Turn on the secondary display.
	NOTE: Select ***Audio Pause*** to acknowledge the message, if the USB cable is disconnected or the secondary display turned off on purpose.	
	3. User interface board communication failure.	3. Update PUIC (Power Management and User Interface Controller) software (host software) or replace user interface board.
Power management failure	Power Management Controller (communication) failure.	Update PUIC software (host software) or replace the DC/DC board.
Setting activation after next case end./ Setting activation after next discharge.	Service user has initiated a delayed settings activation that will automatically take place after next case end. / next discharge.	If required, the service user may cancel the delayed setting activation. See section 7.17.4. Canceling pending settings activation
Software activation after next case end./ Software activation after next discharge.	Service user has initiated a delayed software activation that will automatically take place after next case end / next discharge.	If required, the service user may cancel the delayed setting activation. See section 7.19.3. Canceling pending host software activation
Service Monitor Activation Failed	Software activation failed.	Reactivate software. If that does not help, reinstall the software and then reactivate it.
	Setting activation failed.	Reactivate settings.
Module voltage low	• One of the supply voltages for the acquisition modules is out of specification. • An analog output voltage is out of specification.	Log in to Webmin and select ***Diagnostics > Hardware Stats*** to diagnose the problem. If there is a faulty board, replace it.
Application error: Webmin	The operating system informs that the Webmin local browser was terminated abnormally.	Select ***Audio Pause*** to acknowledge the message.

Message	Possible causes	Possible solutions
Replace battery A ***Replace battery B***	The full capacity of the battery is less than or equal to 50% compared to the full capacity of a new battery.	Replace the monitor battery with a new one.
Battery A failure ***Battery B failure***	Battery failure.	Replace battery with a new one.
Condition Battery A ***Condition Battery B***	Battery needs conditioning.	Condition the monitor battery. See section 10.4.5. Conditioning a battery
Battery A temperature high ***Battery B temperature high***	Battery temperature error due to faulty battery or battery management error.	Replace battery with a new one. If that does not help, replace the DC/DC board.
Speaker failure	1. Speaker cable loose.	1. Connect the speaker cable.
	2. Speaker failure.	3. Replace the speaker.
	4. CPU tone generator or audio amplifier failure.	5. Replace the CPU carrier board.

11.8 Problems and solutions

11.8.1 Start-up failures

Problem	Possible causes	Recommended actions
Unable to turn on the patient monitor when it is powered from the AC mains. Monitor battery is not installed.	Power cord is loose.	Ensure that the power cord is connected properly to the wall outlet and to the patient monitor.
	Blown fuses.	Check the status of the fuses and replace them, if necessary. - Use only fuses with correct rating. - If the fuses are blown repeatedly, investigate the patient monitor carefully for possible short circuits.
	Power cord is faulty.	Check the power cord for wear and damage and replace if necessary.
	The power outlet does not meet specified requirements.	Check the power outlet being used: - Refer to the patient monitor's supplemental information manual for power requirements. - Check the power outlet being used, see section 8.2.2.
	The cable between the AC/DC power supply unit and the DC/DC board is loose or faulty.	Check that the cable is intact and properly connected to the AC/DC power supply unit and the DC/DC board.
	The AC/DC power supply is faulty.	Replace the AC/DC power supply unit.
	The DC/DC board is faulty.	Replace the DC/DC board.
Unable to turn on the patient monitor when it is powered from the monitor battery. The patient monitor is not connected to the AC mains.	Battery Empty	Check the battery charge status, see section 6.1.1. Charge or replace the battery.
	Battery Failure or missing battery.	Check the status of the battery charge/failure indicator, see section 6.1.1. Depending on the LED status: - Insert a battery. - Replace the battery.
	DC/DC board failure.	Replace the DC/DC board.

Problem	Possible causes	Recommended actions
Unable to turn on the patient monitor when it is both connected to AC mains and a fully charged monitor battery is installed.	The cable between user interface board and DC/DC board is loose or faulty.	Check the status of the red ON/Stdby-button LED on DC/DC board when On/Stdby button is pushed. During the push LED should illuminate. If it is not illuminating, the cable between the user interface board and DC/DC board is loose or faulty, or the user interface board is faulty. Check that the cable is intact and properly connected to the user interface board and the DC/DC board. - Reconnect the cable, if loose. - Replace the user interface cable, if the cable is faulty.
	The user interface cable is loose or faulty.	Connect or replace the user interface cable.
	The user interface board is faulty.	Replace the user interface board.
	DC/DC Board failure.	Replace the DC/DC board.
Unable to turn on the patient monitor: - The patient monitor starts, but the primary display remains “black”, i.e the backlight does not illuminate the LCD display.	The backlight cable between the LCD display and the DC/DC board is loose or faulty.	Check that the backlight cable is intact and properly connected to the DC/DC board and the LCD display. - Reconnect the cable, if loose. - Replace the backlight cable, if the cable is faulty.
	The LED backlights in the LCD display are faulty.	Replace the LCD display unit.
Unable to turn on the patient monitor: - The patient monitor starts, but the primary display remains “white”, i.e., the backlight illuminates the LCD display, but nothing appears on the screen. No error messages.	The display cable is damaged or loose.	Check that the display cable is intact and properly connected to the LCD display and the CPU board.
	The LCD display is faulty.	Replace the LCD display unit.
	The display controller section of the CPU module is faulty.	Connect a secondary display to the patient monitor. If there is no picture on the secondary screen either, the display controller section in CPU module is most likely faulty. Replace the CPU assembly.
Unable to turn on the patient monitor: - The patient monitor starts, but the start-up sequence does not advance beyond the GE logo screen. Error messages may appear to the screen.	1. uDOM is missing or loose. 2. uDOM software is corrupted. 3. uDOM has incompatible software.	1) Ensure that the uDOM is properly connected and aligned to the connector in the CPU carrier board. 2) Replace uDOM. Contact GE service for support. 3) Ensure that the attached uDOM has correct and compatible software. Contact GE service for support.

11.8.2 User interface issues

Touchscreen

Problem	Possible cause	Recommended actions
Touchscreen operation inaccurate.	Touchscreen not calibrated.	Calibrate touchscreen, see section 7.1.2.
Touchscreen inoperative.	Touchscreen cable loose	Connect touchscreen cable to the DC/DC board.
	Faulty touchscreen sensor.	Replace the front unit assembly.

On/standby button and alarm light issues

Problem	Possible cause	Recommended action
On/Standby and the power indicator LEDs are inoperative.	User interface cable is loose or faulty.	Check user interface cable and replace it, if necessary
	User interface board is faulty.	Replace the user interface board.
Alarm light does not illuminate when there is an alarm condition on (audible alarms work and alarm message is visible)	Alarm light cable is loose.	Connect the alarm light cable to the DC/DC board.
	Alarm light board or alarm light cable is faulty.	Replace the alarm light board
Alarm light does not illuminate during power-on self test.	"Warm start"	It is less than 15 minutes since the last power-up (warm start) and this normal operation. The alarm light illuminates during the power-on self test only if it is a cold start (more than 15 minutes from the previous start-up).

Alphanumeric Keyboard and barcode scanner issues

Problem	Possible cause	Recommended action
Wrong character is displayed when a key is pressed on keyboard.	The keyboard locale is not configured correctly.	Configure the keyboard locale correctly, see 7.10.
Wrong character is displayed when a barcode is read.	The keyboard locale is not configured correctly.	Configure the keyboard locale correctly, see 7.10.
	The barcode reader's language configuration is incorrect.	Refer to the barcode reader manual.
Barcode reader does not read a multi-field barcode correctly. (i.e., the information is not populated correctly to the fields in the Admit menu).	Barcode reader parser configuration is incorrect.	Configure the barcode settings, see 7.8.2.
	The barcode reader is incompatible with the parser configuration (field lengths, field types, delimeters, symbologies etc.).	Check the barcode information content and compare it to the current parser configuration.

Speaker / audible alarm issues

Problem	Possible cause	Recommended action
Audible alarms do not work.	Audible alarms are turned off (See ***Alarms Setup > Audible & Visual.***)	Enable audible alarms.
	Alarm volume is low.	Adjust alarm volume (***Monitor Setup > Sound Volumes***).
	Speaker failure	Replace the speaker unit.
	Speaker cable loose or faulty.	Check that the speaker cable is intact and properly connected to the E-module board.
	Tone generator or audio amplifier failure	Replace CPU board assembly.

11.8.3 Incorrect system time

Problem	Possible cause	Recommended action
System time is incorrect when patient monitor is not connected to network.	CPU timekeeper battery empty	Replace CPU timekeeper battery.
	Time not configured properly	Configure date and time, see 7.3.
System time is incorrect when patient monitor is connected to MC Network.	Network device time synchronization error.	When adding a new device to the CARESCAPE Network, the existing devices on the CARESCAPE Network will synchronize to the new device's time. To prevent potential time synchronization issues, you should set the new device's time to be as close as possible to the time (within one minute or less) used by the existing GE devices on the CARESCAPE Network.
System time is incorrect when patient monitor is connected to S/5 network.	iCentral time incorrect.	Configure iCentral time master.

11.8.4 License issues

Problem	Possible cause	Recommended action
Unable to perform a function or a feature is not available.	- A license has not been purchased for the feature. - The trial license has expired for the feature. - The license is not installed properly.	See License management chapter.
Unable to view a certain feature although the license is enabled.	The software package in use does not include the feature in question. (For example, Anesthetic agent measurement is not supported by ICU software package).	1. Log in to ***Webmin > Configuration > Licenses >Software Package.*** 2. Select the correct option and select ***Save***.
Unable to upload a license file.	- The license file is corrupted. - The license file is for a patient monitor with a different serial number.	Log in to ***Webmin > Configuration > Licenses***. - If you have printed license information, select ***Software Package*** and ***Host Licensing***. - If you have a license file, select ***Upload License***.
The wrong software application is displayed on the patient monitor.	The wrong software application is activated for the device.	1. To view the software package that is currently activated, Log in to ***Webmin > Configuration >Licenses > Host Licensing***. 2. Make sure that the desired software application is displayed under ***Currently Active Software Package***. 3. If you need to activate a different software package, access ***Configuration > Licenses > Software Package***. 4. Select the correct option and select ***Save***.

11.8.5 Recorder issues

Problem	Possible cause	Recommended action
Recorder does not work.	Graph location is not configured correctly.	Check the configuration: ***Monitor Setup > Printing > Devices > Setup.***
	Recorder unit failure.	Replace the recorder unit.
	CPU board failure	The serial communication for the recorder is managed by the EMBC section of the CPU carrier board. - Check EMBC Frame logs for possible EMBC failures. If the cause is none of the above, the problem is most likely in the CPU assembly. Replace the CPU assembly.
Recorder works but nothing appears on the paper.	Paper installed upsidedown.	Turn the paper roll over. To test which side is active: - Place the paper on a hard surface and draw a line with a fingernail - a dark line will appear on the active (thermal) side.

11.8.6 Acquisition module problems

Problem: an acquisition module does not work with the patient monitor.
Locate first whether the problem is in the patient monitor or in the acquisition module:

1. Connect another, similar, known good module to the suspect patient monitor and check if the module works normally:
   - "Yes" => The suspect module is most likely faulty. Refer to Module Frames and Modules Technical Manual for troubleshooting instructions.
   - "No" => The problem is most likely in the patient monitor. Continue troubleshooting the problem according to the related troubleshooting chart below.

OR

Connect the suspect acquisition module to another, similar, known good patient monitor and check if the module works normally:

- "Yes" => The problem is most likely in the patient monitor. Continue troubleshooting the problem according to the related troubleshooting chart below.
- "No" => The suspect module is most likely faulty. Refer to Module Frames and Modules Technical Manual for troubleshooting instructions.

E-module issues

Possible cause	Recommended action
Incompatible module	Refer to the patient monitor's supplemental information manual document to see the list of compatible modules.
DC/DC board failure	The +15 V MOD supply voltage for the E-module board is generated in the DC/DC board. Check from Webmin Hardware Statistics that the supply voltage is within specification If the +15 V MOD is out of spec, the problem is most likely in the DC/DC board. Replace the DC/DC board.
CPU assembly failure	The RS-485 communication for the E-modules is managed by the EMBC section of the CPU carrier board. - Check EMBC Frame logs for possible EMBC failures. If the cause is none of the above, the problem is most likely in the CPU carrier board. Replace the CPU assembly.

PSM module issues

Possible cause	Recommended action
Pole mount cable loose or faulty (if the PSM module is mounted to a pole mount)	Check that the Module Bus Adapter for PSM and the connection cable is intact and properly connected to the PSM module mounted to the IV pole and to the PSM connector in the patient monitor.
DC/DC board failure	The +15VMOD supply voltage for the PSM module is generated in the DC/DC board. Check that it is within specs, see section 11.3.1 for: - +15VMOD voltage (mV) If +15VMOD voltage is out of spec, the problem is most likely in the DC/DC board. Replace the DC/DC board.
CPU assembly failure	The RS-485 communication for the E-modules is managed by the EMBC section of the CPU carrier board. - Check EMBC Frame logs for possible EMBC failures, see section 11.3.4. If the cause is none of the above, the problem is most likely in the CPU carrier board. Replace the CPU assembly.

PDM module issues

Possible cause	Recommended action
DC/DC board failure	The VSYS supply voltage for the PDM module is generated in the DC/DC board. Check from the Webmin ***Hardware Statistics*** that the supply voltages are within specification: - VSYS voltage (mV) - VSYS_EPORT(mV) - VSYS_PDM (mV) If PDM is connected to PDM dock, DC/DC board should identify PDM and enable the VSYS_PDM circuit breaker on CPU carrier board to connect VSYS voltage to VSYS_PDM. If PDM is connected to ePORT, DC/DC board should identify PDM and enable the VSYS_EPORT circuit breaker on CPU carrier board to connect VSYS voltage to VSYS_EPORT. If VSYS voltage is out of spec, the problem is most likely in the DC/DC board. Replace the DC/DC board.
CPU assembly failure	The Ethernet communication for the PDM module is managed by the CPU carrier board. Check PDM Log for possible PDM errors messages, see section 11.3.4. If the cause is none of the above, the problem is most likely in the CPU carrier boar. Replace the CPU assembly.

11.8.7 CARESCAPE Network communication issues

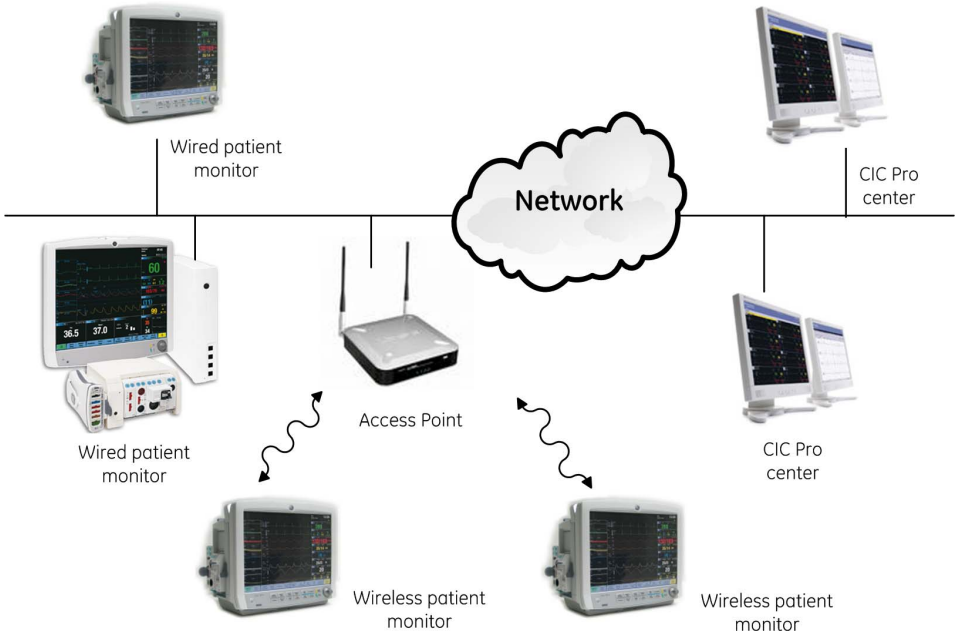
Traffic types

Two main types of communication occurs in the CARESCAPE Network: Broadcast and Unicast.

- Broadcast traffic is sent from one device to all devices on the network. Examples of CARESCAPE broadcast traffic are device discovery, alarms, and time synchronization.
- Unicast traffic is sent from one device to another specific device on the network. An example of CARESCAPE unicast traffic is patient waveforms.

Flow

- Upstream broadcast: The patient monitor sends broadcasts to other network devices.
- Downstream broadcast: The patient monitor receives broadcasts from other network devices.



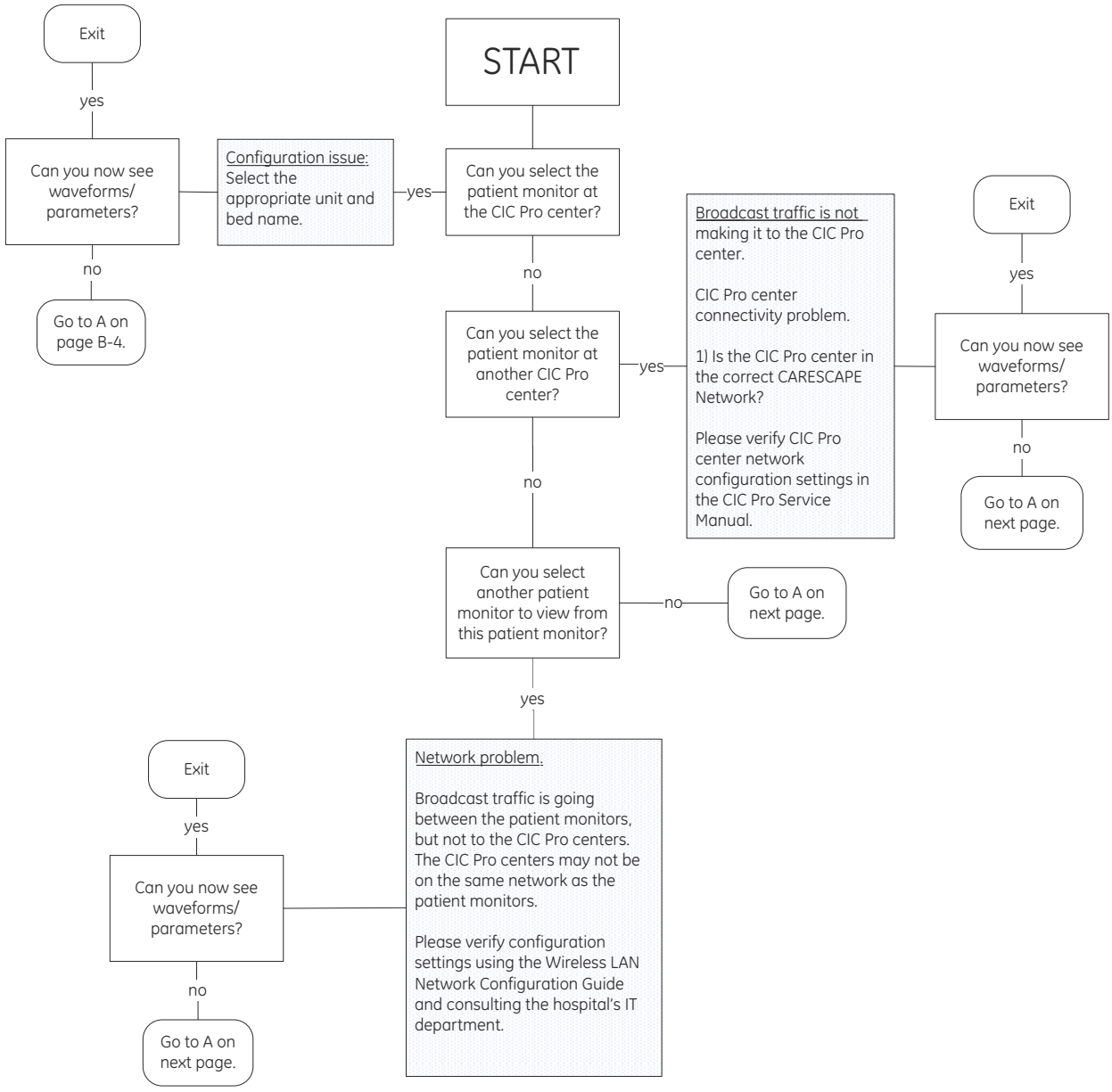
Types:
- Broadcasts (discovery, alarms, time)
- Unicasts (waveforms, ping)

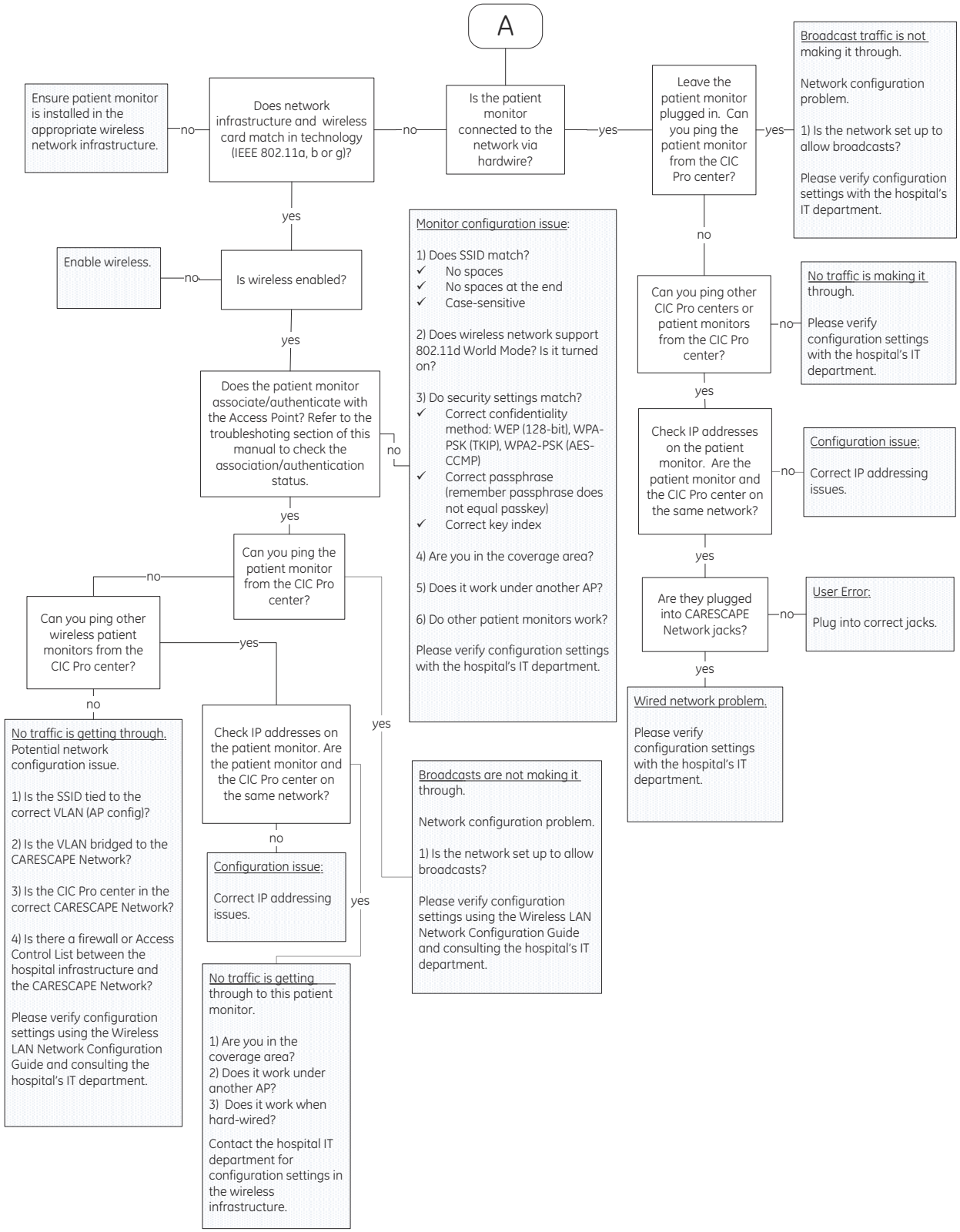
Mediums:
- Wired
- Wireless

Flow:
- Upstream Broadcast
- Downstream Broadcast
- Bi-Directional Unicast

Combinations:
- Wired Broadcast
- Wired Unicast
- Wireless Broadcast
- Wireless Unicast

Problem: No waveforms or parameters are displayed at the CIC Pro center


START
Can you select the patient monitor at the CIC Pro center?
yes
Configuration issue: Select the appropriate unit and bed name.
Can you now see waveforms/ parameters?
yes
Exit
no
Go to A on page B-4.
no
Can you select the patient monitor at another CIC Pro center?
yes
Broadcast traffic is not making it to the CIC Pro center.
CIC Pro center connectivity problem.
1) Is the CIC Pro center in the correct CARESCAPE Network?
Please verify CIC Pro center network configuration settings in the CIC Pro Service Manual.
Can you now see waveforms/ parameters?
yes
Exit
no
Go to A on next page.
no
Can you select another patient monitor to view from this patient monitor?
no
Go to A on next page.
yes
Network problem.
Broadcast traffic is going between the patient monitors, but not to the CIC Pro centers. The CIC Pro centers may not be on the same network as the patient monitors.
Please verify configuration settings using the Wireless LAN Network Configuration Guide and consulting the hospital's IT department.
Can you now see waveforms/ parameters?
yes
Exit
no
Go to A on next page.


A
Is the patient monitor connected to the network via hardwire?
yes
Leave the patient monitor plugged in. Can you ping the patient monitor from the CIC Pro center?
yes
Broadcast traffic is not making it through.
Network configuration problem.
1) Is the network set up to allow broadcasts?
Please verify configuration settings with the hospital's IT department.
no
Can you ping other CIC Pro centers or patient monitors from the CIC Pro center?
no
No traffic is making it through.
Please verify configuration settings with the hospital's IT department.
yes
Check IP addresses on the patient monitor. Are the patient monitor and the CIC Pro center on the same network?
no
Configuration issue:
Correct IP addressing issues.
yes
Are they plugged into CARESCAPE Network jacks?
no
User Error:
Plug into correct jacks.
yes
Wired network problem.
Please verify configuration settings with the hospital's IT department.
no
Does network infrastructure and wireless card match in technology (IEEE 802.11a, b or g)?
no
Ensure patient monitor is installed in the appropriate wireless network infrastructure.
yes
Is wireless enabled?
no
Enable wireless.
yes
Does the patient monitor associate/authenticate with the Access Point? Refer to the troubleshoting section of this manual to check the association/authentication status.
no
Monitor configuration issue:
1) Does SSID match?
✓ No spaces
✓ No spaces at the end
✓ Case-sensitive
2) Does wireless network support 802.11d World Mode? Is it turned on?
3) Do security settings match?
✓ Correct confidentiality method: WEP (128-bit), WPA-PSK (TKIP), WPA2-PSK (AES-CCMP)
✓ Correct passphrase (remember passphrase does not equal passkey)
✓ Correct key index
4) Are you in the coverage area?
5) Does it work under another AP?
6) Do other patient monitors work?
Please verify configuration settings with the hospital's IT department.
yes
Can you ping the patient monitor from the CIC Pro center?
no
Can you ping other wireless patient monitors from the CIC Pro center?
yes
Check IP addresses on the patient monitor. Are the patient monitor and the CIC Pro center on the same network?
no
Configuration issue:
Correct IP addressing issues.
yes
No traffic is getting through to this patient monitor.
1) Are you in the coverage area?
2) Does it work under another AP?
3) Does it work when hard-wired?
Contact the hospital IT department for configuration settings in the wireless infrastructure.
yes
Broadcasts are not making it through.
Network configuration problem.
1) Is the network set up to allow broadcasts?
Please verify configuration settings using the Wireless LAN Network Configuration Guide and consulting the hospital's IT department.
no
No traffic is getting through.
Potential network configuration issue.
1) Is the SSID tied to the correct VLAN (AP config)?
2) Is the VLAN bridged to the CARESCAPE Network?
3) Is the CIC Pro center in the correct CARESCAPE Network?
4) Is there a firewall or Access Control List between the hospital infrastructure and the CARESCAPE Network?
Please verify configuration settings using the Wireless LAN Network Configuration Guide and consulting the hospital's IT department.

11.8.8 S/5 Network communication issues

Check the following things before proceeding with any detailed network troubleshooting:

- Check status of the wired and wirelessnetwork connection indicators and the WLAN signal strength indicator, for reference see 3.7.
- Check status of network status LEDs. Check network compatibility. Refer to the patient monitor's supplemental information manual.
- Check that each patient monitor has been assigned a unique Virtual ID key, see 7.2.3.

Wired S/5 network

Problem	Possible cause	Recommended action
Bedside monitor doesn't register to the Monitor Network - all bedside monitors affected.	The problem is related to the iCentral, or to the cabling between the iCentral and the hub/switch.	• Proceed to the iCentral troubleshooting. • Check the cabling between the iCentral and the hub/switch.
Bedside monitor doesn't register to the Monitor Network – only one patient monitor or some of the bedside monitors affected.	The problem is related to the bedside monitor, or to the cabling between the bedside monitor and the hub/switch.	• Check the patient monitor(s)' network configuration. • Check the cabling between the bedside monitors and the hub.
	The problem is related to network setup: the bedside monitor(s) is/are missing from the network setup.	• Check the iCentral network setup.
	The problem is related to view setup: the bedside monitor(s) is/are missing from the view setup.	• Check the iCentral view setup.

Wireless S/5 network

Problem	Possible cause	Recommended action
No wireless connection - the patient monitor does not associate/authenticate with the Access Point, see section 11.3.3 for WLAN diagnostics.	Patient monitor is out of wireless coverage area.	• Contact the hospital IT department to check the wireless coverage area.
	WLAN radio is disabled.	• Enable WLAN radio, see section 7.2.4.
	Incompatible wireless network infrastructure.	• Check that the patient monitor is installed to the appropriate wireless network infrastructure (IEEE 802.11b).
	SSID mismatch between patient monitor and access point.	• Enter correct SSID, see section 7.2.4.
	Security settings mismatch between patient monitor and access point: • Incorrect or incompatible confidentiality method • Incorrect Pass Key • Incorrect key index	• Contact the hospital IT department for correct security settings and then update the patient monitor configuration, see section 7.2.4. • Check that the used security method is none, WEP-64 or WEP-128. • Select correct confidentiality method. • Ensure Pass Key used is correct. • Select correct key index.
	Access control list is in use in the access point. The patient monitor is blocked out.	• Contact the hospital IT department to update the access control.

12 Disassembly and reassembly

12.1 Disassembly guidelines

Field repair of the patient monitor is limited to replacing Field Replaceable Units (FRUs). See chapter 13. Service parts for a detailed list of available FRUs. Attempting a field repair on a printed circuit board or a factory sealed component or assembly could jeopardize the safe and effective operation of the patient monitor.

NOTE: Only a qualified service technician should perform field replacement procedures.

NOTE: Perform the checkout procedure described in chapter 10. Maintenance and checkout each time after you have done any disassembly to the patient monitor.

12.1.1 ESD precautions

All external connectors of the patient monitor are designed with protection from ESD damage. However if the patient monitor requires service, exposed components and assemblies inside are susceptible to ESD damage. This includes human hands, non-ESD protected work stations or improperly grounded test equipment. The following guidelines may not guarantee 100% static-free workstation, but can greatly reduce the potential for failure of any electronic assemblies being serviced:

- Discharge any static charge you may have built up before handling semiconductors or assemblies containing semiconductors.
- A grounded, antistatic wristband or heel strap should be worn at all times while handling or repairing assemblies containing semiconductors.
- Use properly grounded test equipment.
- Use a static-free work surface while handling or working on assemblies containing semiconductors.
- Do not remove semiconductors or assemblies containing semiconductors from antistatic containers until absolutely necessary.
- Do not slide semiconductors or electrical/electronic assemblies across any surface.
- Do not touch semiconductor leads unless absolutely necessary.
- Semiconductors and electronic assemblies should be stored only in antistatic bags or boxes.
- Handle all PCB assemblies by their edges.
- Do not flex or twist a circuit board.

WARNING **Pins of connectors identified with the ESD warning symbol should not be touched. Connections should not be made to these connectors unless electrostatic discharge (ESD) precautions are used.**

12.1.2 Reassembly precautions

Pay attention to the following generic precautions when reassembling the patient monitor:

- Note the positions of any wires, cables or connectors. Mark them if necessary to ensure that they are reassembled correctly.
- Save and set aside all hardware for reassembly
- GE recommends using the new fasteners (screws, washers, etc.) provided in the FRU kits rather than reusing the old fasteners. Some fasteners are not intended to be re-used

more than three times. Use only new screws attaching into light metal parts. Take advantage of existing thread pattern cut by turning the screw counterclockwise until it drops into the existing thread pattern.

- We have added the maximum recommended torque value to be used for each screw and nut in reassembly. These values are listed in brackets after each disassembly step.
- When attaching self-tapping screws to light metal parts without existing threads (new light metal FRU parts), you should use a higher torque than is recommended for reassembled parts, but still not more than 1.6 Nm.

NOTE: It is not required to a use torque wrench or torque screwdriver when reattaching the patient monitor using the recommended standard hand tools. Just ensure visually that the screws are properly attached, but avoid over tightening by using excess force as this may damage the existing thread patterns. However, when using battery-operated tools, ensure that it is equipped with torque limiter and the torque is properly adjusted.

12.1.3 Required tools

- insulated Torx T6 and T10 screwdrivers
- insulated flat blade screwdriver (width 2.5 mm / 0.1 in)
- pliers
- antistatic ESD wristband

NOTE: Use torque wrench and torque screwdriver to comply with the given torques.

WARNING **Due to possible high voltage present, use an insulated screwdriver at all times.**

12.1.4 Before disassembly

WARNING **PATIENT MONITORING INTERRUPTION — Make sure a patient is not being monitored while servicing the equipment.**

WARNING **DISCONNECTION FROM MAINS - When disconnecting the device from the power line, remove the plug from the wall outlet first. Then you may disconnect the power cord from the device. If you do not observe this sequence, there is a risk of coming into contact with line voltage by inserting metal objects, such as the pins of leadwires, into the sockets of the power cord by mistake.**

WARNING **SAFETY GROUND - Remove power cord from the mains source by grasping the plug. Do not pull on the cable.**

WARNING **ELECTRIC SHOCK - Always unplug the grounded cables when not in use. Leaving them connected could result in an electric shock from the ground contact in the other end.**

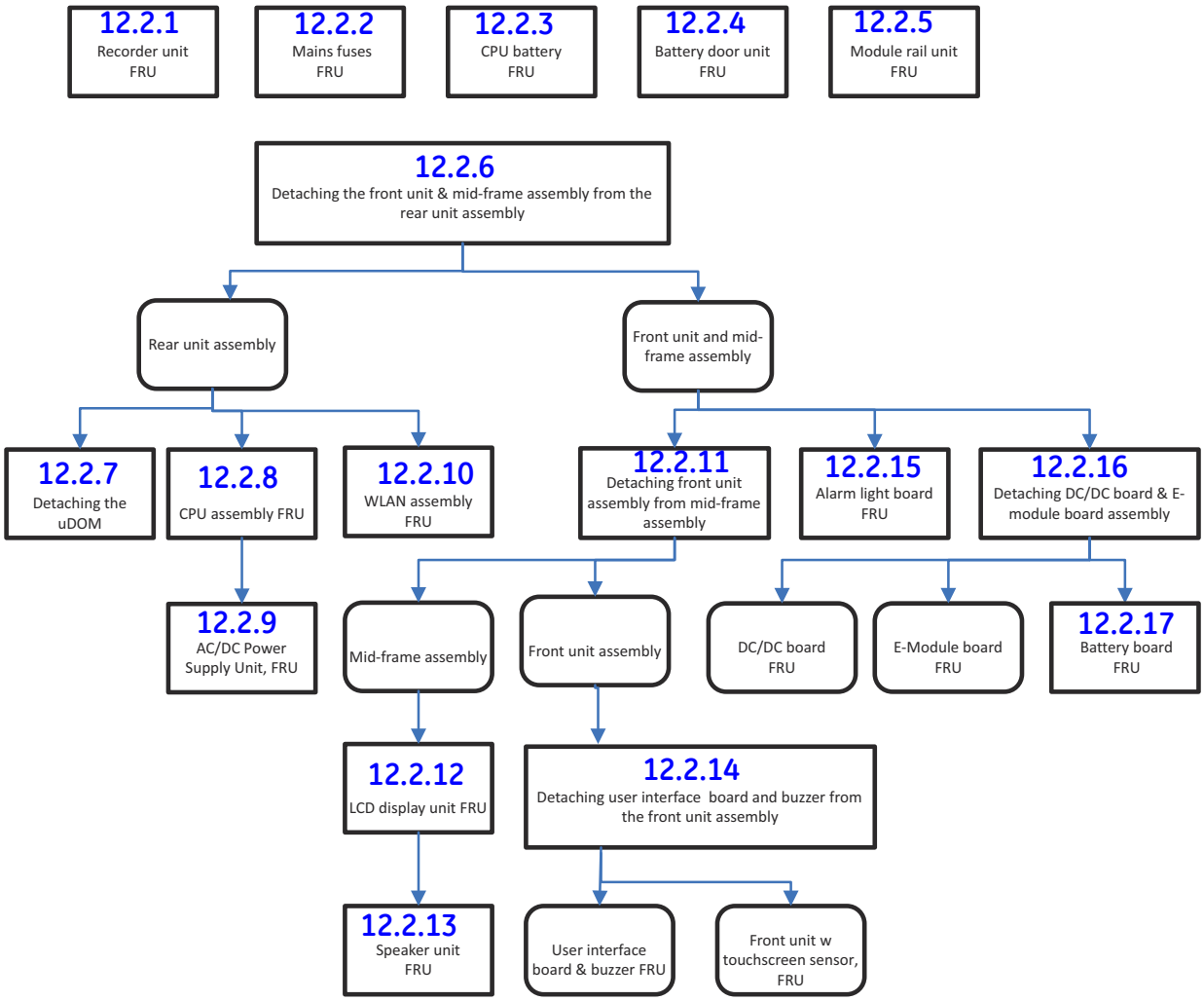
1. Turn the patient monitor off from the **On/standby** button.
2. Disconnect the patient monitor power cord first from the wall outlet and then from the monitor.
3. Remove the patient monitor batteries.
4. Disconnect all external cables connected to the patient monitor.
5. Disconnect all parameter modules.
6. Detach the patient monitor from the mount if installed.

NOTE: If you disconnect the patient monitor from the AC power source and remove the battery prior to turning the monitor off, the monitor will start alarming about power loss situation. Select the ***Silence alarm*** to silence this alarm.

Disassembly workflow

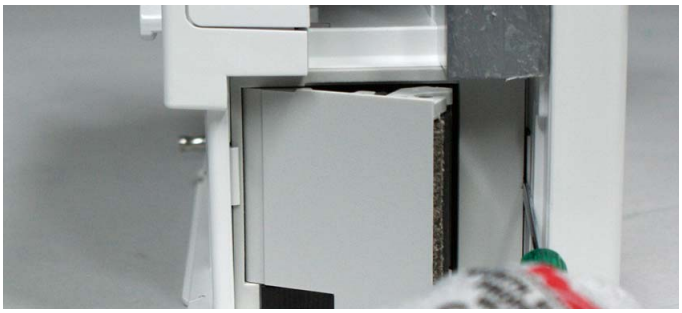
Use this workflow diagram to find the simplest way to disassemble the required parts of the patient monitor. Numbers in the diagram refer to the sections in this Disassembly chapter.

Follow the arrows from the top down to the required part and disassemble the monitor by following the steps in between.



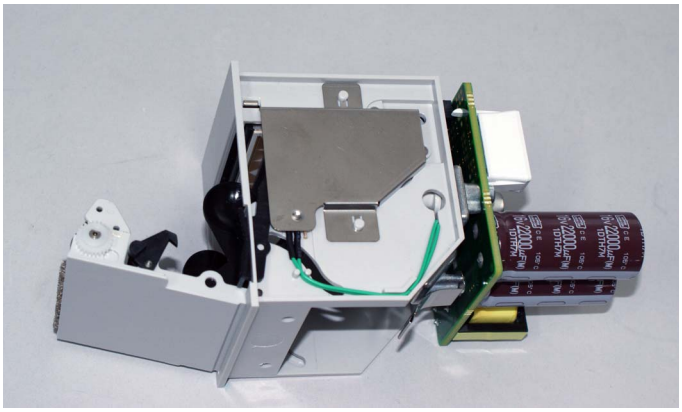
12.2 Disassembly procedures

12.2.1 Replacing the recorder unit (FRU)



1. Open the recorder door and remove the paper roll if installed.
2. Release the two snaps on each side of the recorder by pressing with a flat blade screwdriver.

3. Pull the recorder out of the monitor, first a little by pulling from the recorder door, and then all way out by pulling from the recorder body.
   NOTE: Be careful not to damage the recorder door or the grounding plate when pulling out the recorder.



- FRU, Recorder unit, B450

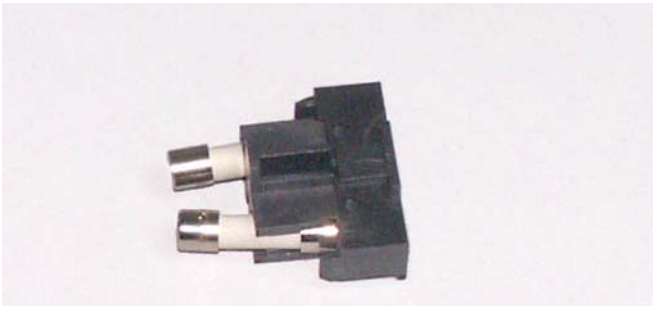
Reassemble in reverse order:

- Push the recorder unit all the way into its slot until it locks.

12.2.2 Replacing the mains fuses (FRU)

The mains fuses are located on the side of the monitor, inside the AC inlet.

1. Release the snap in the fuse holder of the AC inlet by pressing it with a flat blade screwdriver. Pull the fuse holder out of the AC inlet.



2. Replace the fuses with new ones. Use only fuses with the same rating.

Reassemble in reverse order:

- Push the fuse holder all the way in until it snaps to its place.

12.2.3 Replacing the CPU battery (FRU)

1. Remove the screw (T10) holding the service cover. Torque [1.2 Nm].

2. Release the snap that holds the service cover using a flat blade screwdriver.

3. Pull out the service cover.

4. Detach the CPU battery from the CPU carrier board with a flat blade screwdriver.

NOTE: Dispose the battery according to local, state or country laws.

- Reassemble in reverse order.

12.2.4 Replacing the battery door unit (FRU)

1. Open the battery door.
2. Release the snap that holds the battery door assembly to the patient monitor using a flat blade screwdriver.

3. Pull the battery door assembly out of the patient monitor.

- FRU, Battery door unit, B450

Reassemble in reverse order:

- Align the battery door plate to its guide rails.
- Push the battery door assembly all the way into the monitor frame until it snaps to its place.
- Close the battery door.

12.2.5 Replacing the module rail unit (FRU)

1. Remove the four screws (T10) that mount the module rail unit to the rear unit assembly.

NOTE: Notice the torque during the reassembly:

- if you replaced the CPU assembly, use 1.2 Nm.
- if you didn't replace the CPU assembly, use 0.8 Nm.

2. Pull out the module rail unit.

- FRU, Module rail unit, B450

Reassemble in reverse order.

- Ensure that the module rail unit connector is correctly aligned to the connector in the CPU board.

WARNING **Use only GE specified screws and torque when replacing the module rail unit.**

12.2.6 Detaching the front unit and mid-frame assembly from the rear unit assembly

This step only for monitors without a recorder unit:

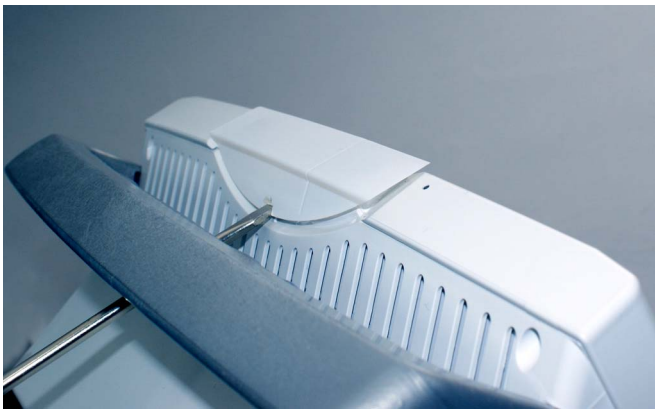
1. Use a flat blade screwdriver to release the snap that fastens the recorder cover plate to the monitor frame. Detach the recorder cover plate.

NOTE: If there is a recorder installed, you do not have to remove it.

1. Remove the screw (T10) holding the service cover. Torque [1.2 Nm].

2. Release the snap that holds the service cover using a flat blade screwdriver.

3. Pull out the service cover.



4. Carefully detach the alarm light lens.
   Release the snaps holding the alarm light lens by sliding a flat blade screw driver under the lens and carefully lift the lens up using the screw driver.

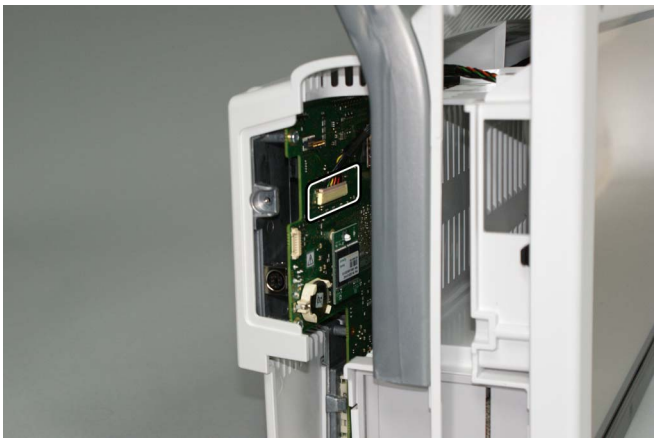
5. Remove the three screws (T10) in the bottom of the patient monitor. Torque [0.6 Nm].

6. Remove the two screws (T10) in the top of the patient monitor. Torque [1.2 Nm].

7. Remove the screw (T10) next to the handle. Torque [1.2 Nm].

8. Pull out the front unit and mid-frame assembly from the rear unit assembly a little so that you have access to the AC/DC and display cables.

9. Detach the AC/DC cable from the DC/DC board connector.



10. Detach the display cable from the CPU carrier board.

11. Pull out the front unit and mid-frame assembly all way out from the rear unit assembly.

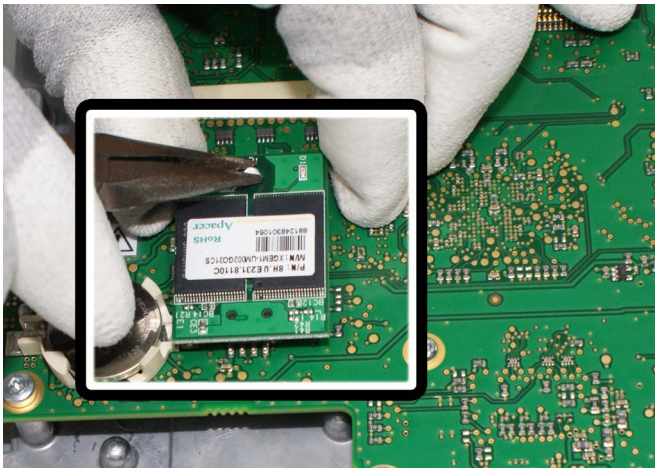
Reassemble in reverse order:

- When reassembling, ensure that the connector in the E-module board is properly aligned with the connector in the CPU carrier board.
- Remember to reconnect the AC/DC cable and the display cable.

12.2.7 Detaching the uDOM

Disassemble first:

a. 12.2.6. Detaching the front unit and mid-frame assembly from the rear unit assembly



Keep the rear unit assembly on the table, the device label side facing down.

1. Carefully detach the uDOM from the CPU assembly. The uDOM is connected to the CPU assembly with a connector from one and with a nylon support post from the other end. You may need pliers to squeeze the nylon support post a little to detach the uDOM.

uDOM replacement:

- Reassemble in reverse order.

Contact GE Service if you doubt that the uDOM is defective. Some of the reconfiguration steps required after uDOM replacement can be performed only by GE service.

NOTE: The uDOM service part includes software, but no licenses. The monitor serial number and all clinical and platform settings are set into factory defaults.

After replacing the uDOM, and reassembling the patient monitor, perform the following tasks:

1. Connect the power cord to the patient monitor and to the wall outlet.
2. Turn on the patient monitor from the On/Standby button. The new software in the uDOM will install automatically during the first restart. This may take several minutes and the patient monitor may reboot automatically. Wait until the software installation is completed, and normal monitoring screen appears. Do not interrupt software installation.
3. Login to Webmin and perform the following configurations:
   a) Restore the backup copy of the saved platform and clinical settings back to the monitor (see 7.17)
   b) Enter the original Host Serial Number printed to the device plate (see 7.13).
   c) Reload licenses from a license file, or enter them manually (see 7.18).
4. Perform a complete checkout procedure (see 10).

12.2.8 Detaching the CPU assembly (FRU)

The CPU assembly consists of CPU carrier board, CPU module and uDOM.

Disassemble first:

a. 12.2.6. Detaching the front unit and mid-frame assembly from the rear unit assembly

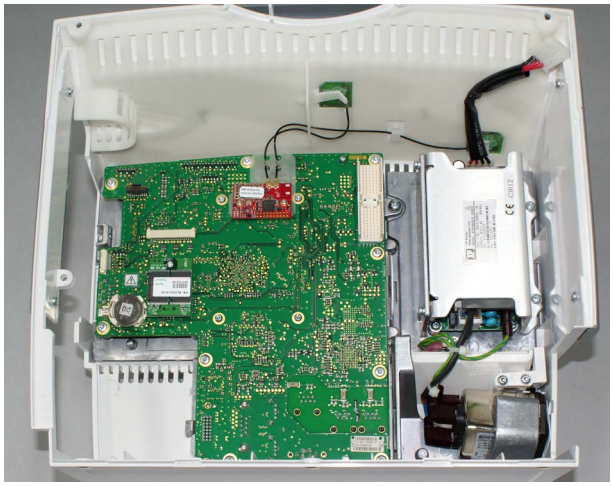
Keep the rear unit assembly upright on the table. Support the CPU board and AC/DC power supply unit with your hand, so that they do not drop when you perform the following steps.

1. Remove the four screws (T10) that mount the module rail unit to the rear unit assembly.

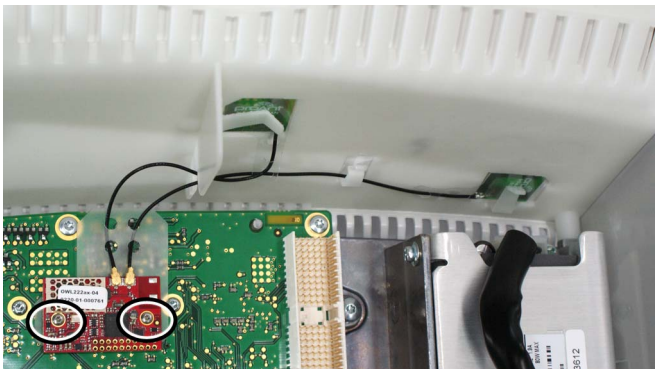
NOTE: Notice the torque during the reassembly:

- if you replaced the CPU assembly, use 1.2 Nm.
- if you didn't replace the CPU assembly, use 0.8 Nm.

2. Pull out the module rail unit.

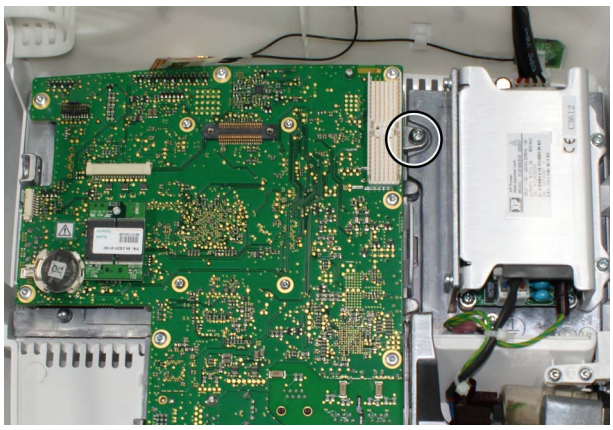


Keep the rear unit assembly on the table, the device label side facing down.



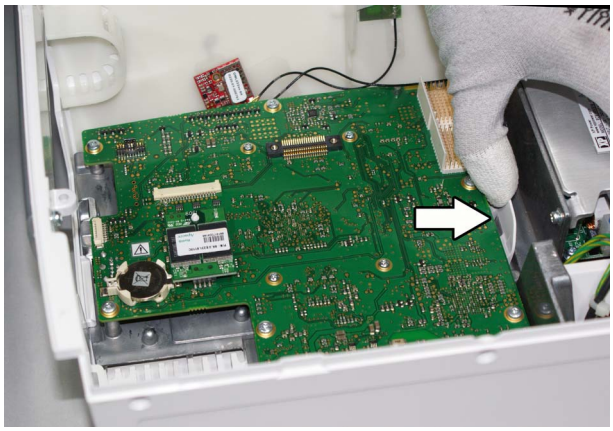
3. Detach the WLAN card from the CPU carrier board, if installed.
   a. Remove the two screws (T6) that hold the WLAN radio card to the CPU carrier board. Torque [0.3 Nm].
   b. Detach the WLAN radio card carefully from its connector in the CPU carrier board.

NOTE: Be careful not to damage the fragile WLAN antenna boards or antenna cables.

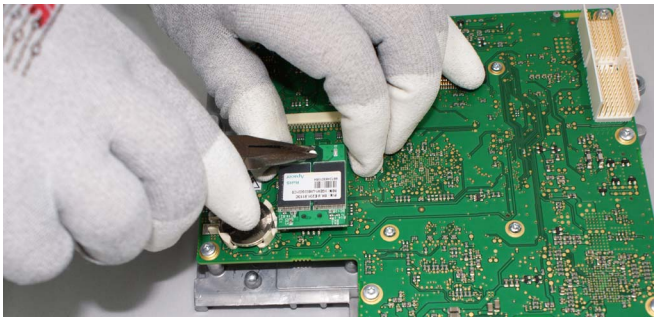


4. Detach the grounding screw (T10) holding the CPU assembly and AC/DC unit together. Torque [1.6 Nm].

NOTE: During the reassembly, make sure to fasten the grounding screw properly. This is important to ensure that the CPU assembly is properly connected to the protective earth.

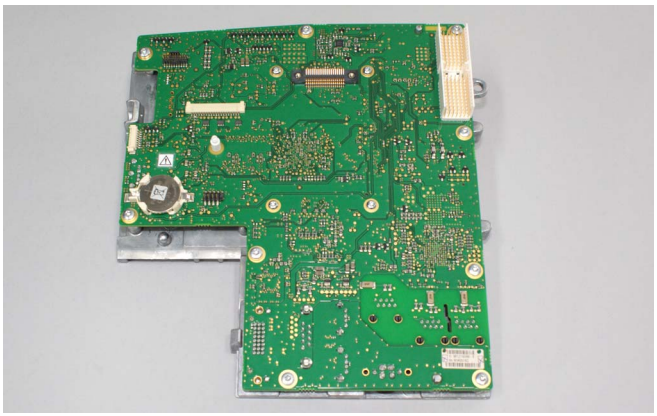


5. Release the latch holding the CPU assembly and pull the assembly out from the rear unit.



6. Carefully detach the uDOM from the CPU assembly. The uDOM is connected to the CPU assembly with a connector from one and with a nylon support post from the other end. You may need pliers to squeeze the nylon support post a little to detach the uDOM.

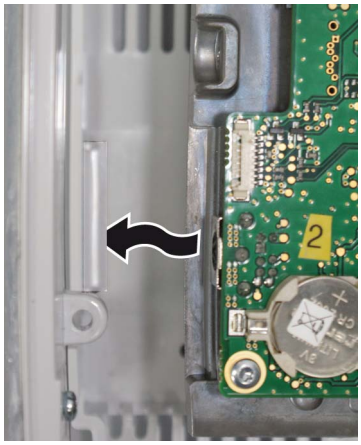
   NOTE: If replacing the CPU assembly, detach the original uDOM from the CPU carrier board and then attach it to the new CPU assembly. The software, licenses and clinical and service configurations are stored in the original uDOM.

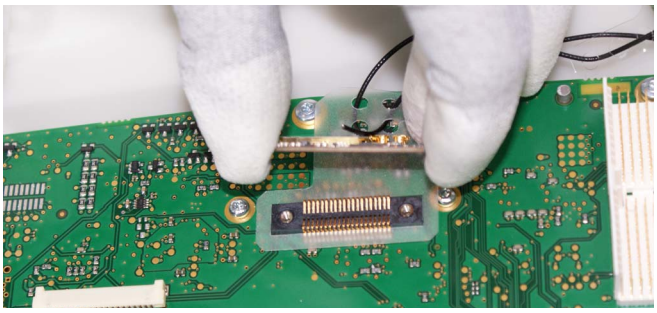


- FRU, CPU assembly, B450

Reassemble in reverse order. Note the following:

- **Step 6:** Remember to first reattach the original uDOM to the CPU assembly.
- **Step 5:** When reassembling the CPU assembly, make sure to first place the heat sink under the plastic lip of the rear unit assembly. Then press the other edge of the heat sink under the latch.





Step 3:

- Remember to reattach the WLAN radio card back to the CPU assembly. Place the WLAN antenna guide around the CPU board connector before reattaching the connector.

Step 1:

- Check the correct position of the CPU assembly and the AC/DC power supply unit before you fasten the four screws (T10) that hold the CPU assembly and the module rail unit to the rear unit assembly.
- Support the CPU assembly and the AC/DC power supply with your hands, while you attach and tighten the screws.

  NOTE: Notice the torque during the reassembly:

  - if you replaced the CPU assembly, use 1.2 Nm.
  - if you didn't replace the CPU assembly, use 0.8 Nm.

WARNING **Use only GE specified screws and torque when replacing the module rail unit.**

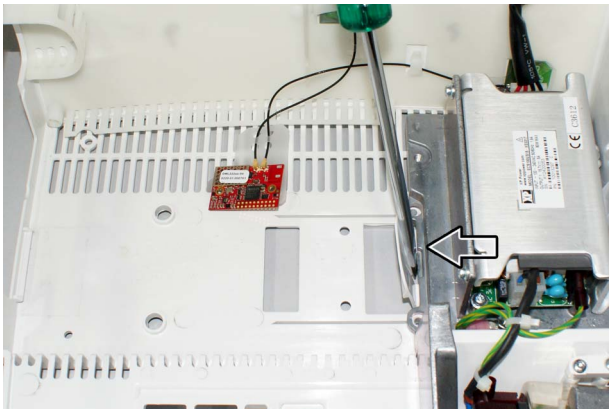
NOTE: After replacing the CPU Assembly, during the first start-up, the patient monitor will automatically check the EMBC software version in the replaced CPU Assembly and update the software if necessary. Wait for 5 minutes to see if the software update is initiated and do not interrupt the process.

12.2.9 Replacing the AC/DC power supply unit (FRU)

Disassemble first:

a. 12.2.6. Detaching the front unit and mid-frame assembly from the rear unit assembly

b. 12.2.8. Detaching the CPU assembly (FRU)



Keep the rear unit assembly on the table, the device label side facing down.

1. Press the latch and pull out the AC/DC power supply unit from the rear unit.

NOTE: Be careful not to damage the fragile WLAN antenna boards or antenna cables.

Reassemble in reverse order.

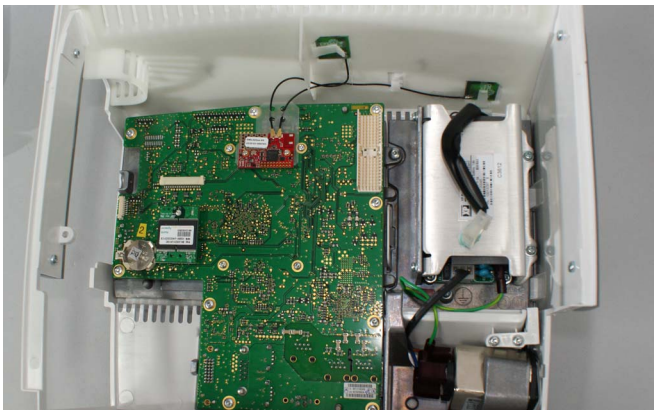
- Ensure that the AC/DC power supply unit is properly aligned to the rear unit assembly.
- Make sure that the primary conductors are not squeezed.

- FRU, AC/DC power supply unit, B450

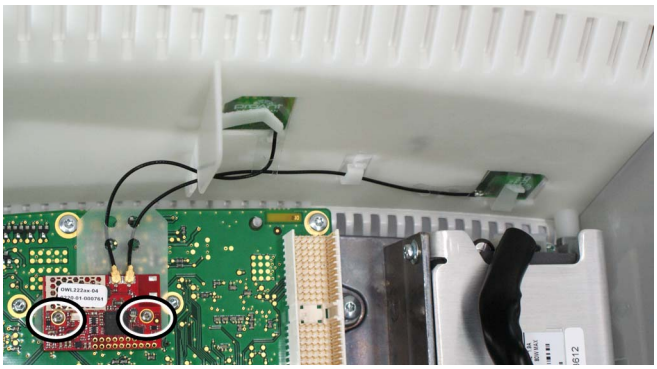
12.2.10 Replacing the WLAN assembly (FRU)

Disassemble first:

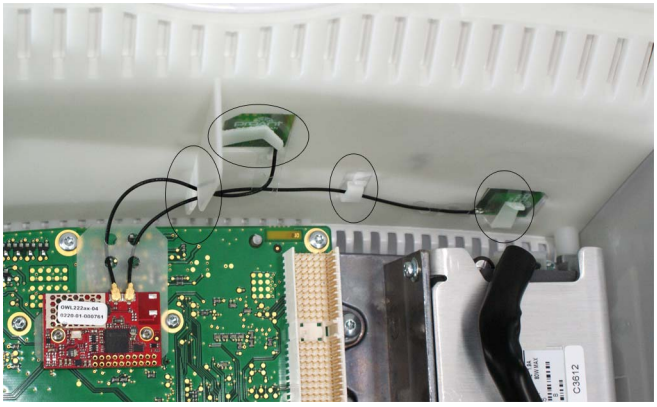
a. 12.2.6. Detaching the front unit and mid-frame assembly from the rear unit assembly



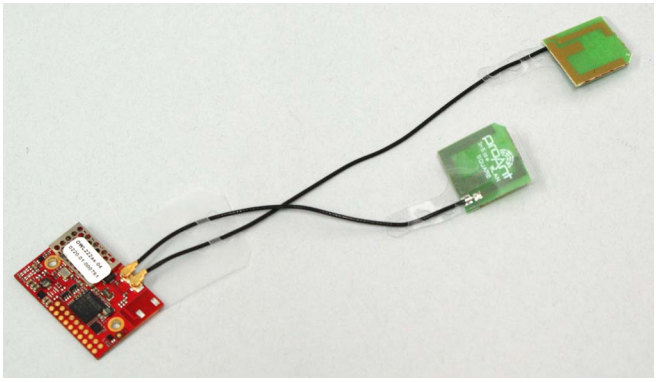
1. Keep the rear unit assembly on the table, the device label side facing down. Be careful not to damage the fragile WLAN antenna boards and antenna cables.



2. Remove the two screws (T6) that hold the WLAN radio card to the CPU assembly. Torque [0.3 Nm]. Detach the WLAN radio card carefully from its connector in the CPU carrier board.



3. Detach the two WLAN antenna boards and antenna cables carefully from their holders on the inner roof of the rear unit.



- FRU, WLAN assembly, B450

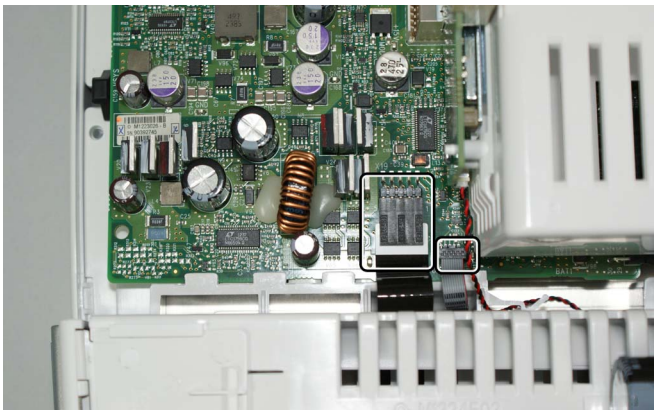
Reassemble in reverse order:

- Be careful not to bend the antenna boards or damage the antenna cards.
- Ensure that the antenna boards and antenna cables are properly mounted to their holders on the inner roof of the rear unit.

12.2.11 Detaching the front unit assembly from the mid-frame assembly

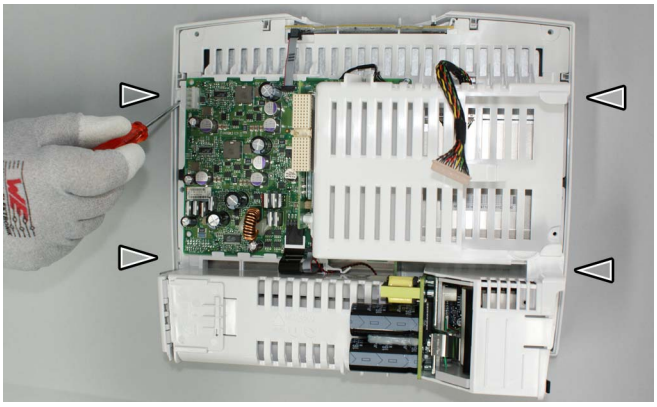
Disassemble first:

a. 12.2.6. Detaching the front unit and mid-frame assembly from the rear unit assembly



Keep the front unit and mid-frame assembly on the table the display facing down. Protect the touchscreen sensor from any scratches and dust.

1. Detach user interface and touchscreen cables from the DC/DC board.



2. Release the four snaps - two on each side - that mount the front unit assembly to the mid-frame assembly.

3. Carefully support the LCD display while you lift the mid-frame assembly from the front unit assembly. The LCD display should remain attached to the display holder of the mid-frame unit with the two rubber fasteners of the display gasket. Guide the disconnected cables through the openings in the unit.

- Front unit assembly

- Mid-frame assembly

Reassemble in reverse order:

- Ensure that the display gasket is correctly aligned and that the four snaps lock properly when attaching the front unit assembly back to the mid-frame assembly.
- Guide the touchscreen and user interface cables through the openings in the mid-frame assembly. Connect the cables to the connectors in the DC/DC board.

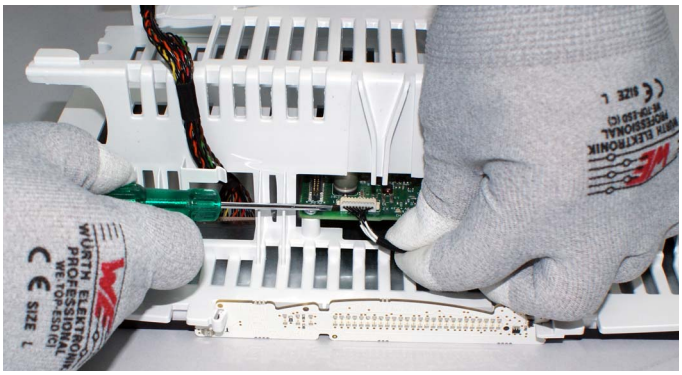
NOTE: You may find it easier to first connect the user interface cable to the DC/DC board and guide it towards the user interface board through the opening in the mid-frame assembly.

12.2.12 Replacing LCD display unit (FRU)

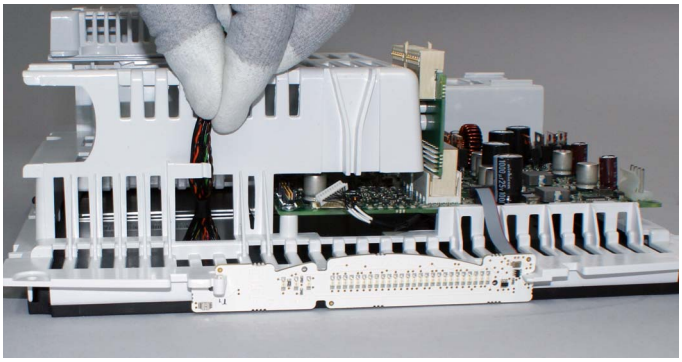
Disassemble first:

a. 12.2.6. Detaching the front unit and mid-frame assembly from the rear unit assembly

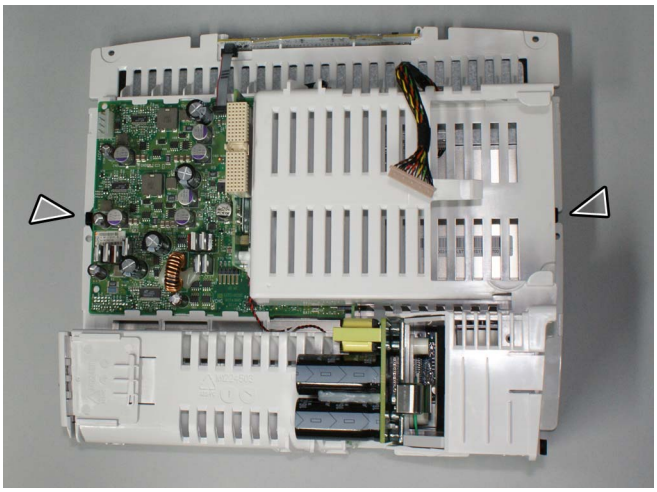
b. 12.2.11. Detaching the front unit assembly from the mid-frame assembly



1. Detach the LCD backlight cable from the DC/DC board using a screw driver.



2. Guide the display cable through the openings in the mid-frame unit. free.



3. Detach the two rubber fasteners that hold the LCD display attached to the plastic display holder of the mid-frame unit.

4. Lift the LCD display with its gasket from the display holder in the mid-frame unit.

- FRU, LCD Display unit, B450

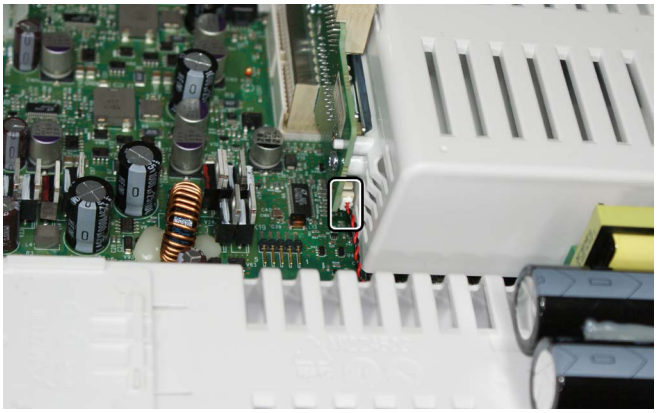
Reassemble in reverse order.

1. Guide the display and LCD backlight cables back through the openings in the mid-frame assembly.
2. Check that the display gasket is properly aligned around the LCD display. Then carefully align the LCD display with the gasket to the display holder in the mid-frame assembly and lock the two rubber fasteners to the mid-frame.
3. Connect the LCD backlight cable to the DC/DC board.

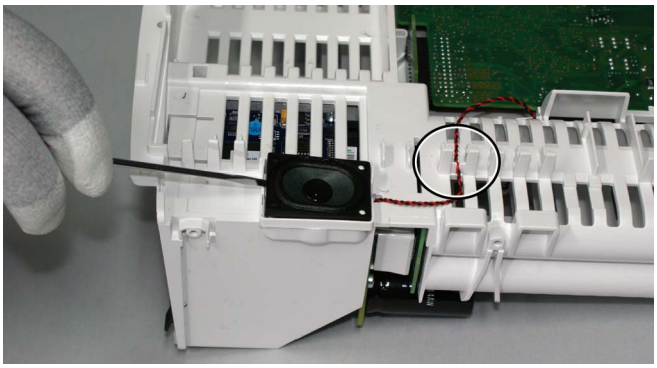
12.2.13 Replacing the Speaker unit (FRU)

Disassemble first:

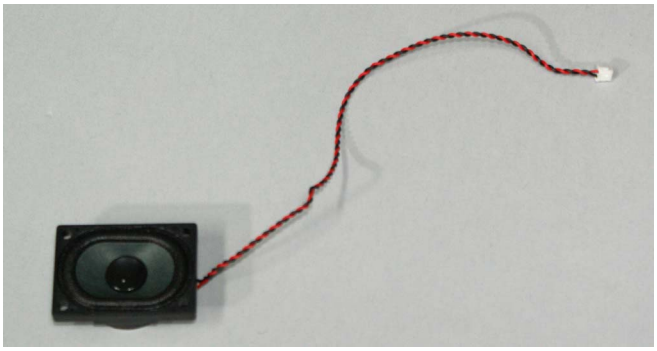
a. 12.2.6. Detaching the front unit and mid-frame assembly from the rear unit assembly
b. 12.2.11. Detaching the front unit assembly from the mid-frame assembly
c. 12.2.12. Replacing LCD display unit (FRU)



1. Detach the speaker cable from the E-module board and guide it through the openings in the mid-frame unit.



2. Lift the speaker up using a screw driver and detach the speaker.



- FRU, Speaker Unit, B450

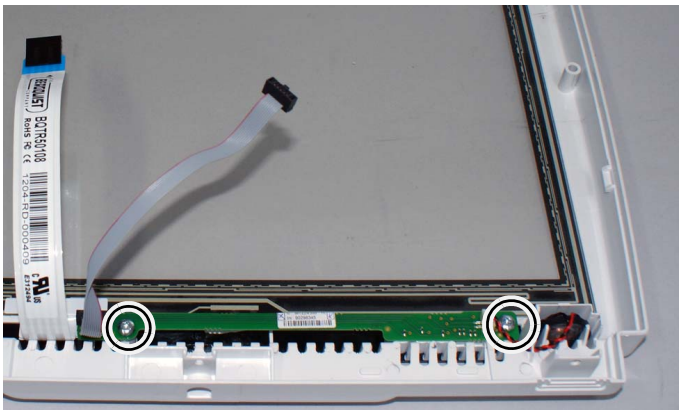
Reassemble in reverse order.

- While reattaching make sure to guide the speaker cable correctly through the cable clamp and the guiding notch.

12.2.14 Detaching the user interface board and buzzer from the front unit assembly

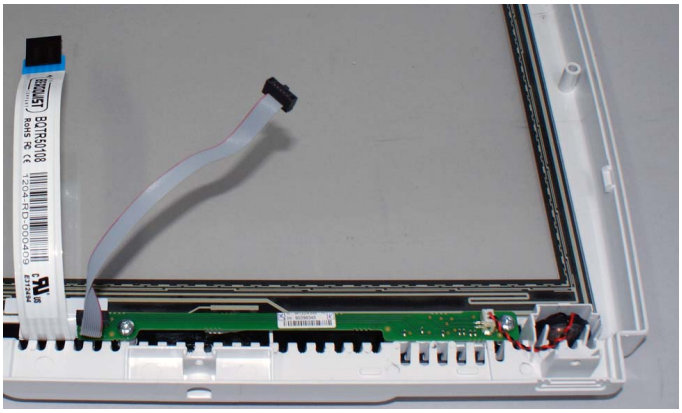
Disassemble first:

a. 12.2.6. Detaching the front unit and mid-frame assembly from the rear unit assembly
b. 12.2.11. Detaching the front unit assembly from the mid-frame assembly

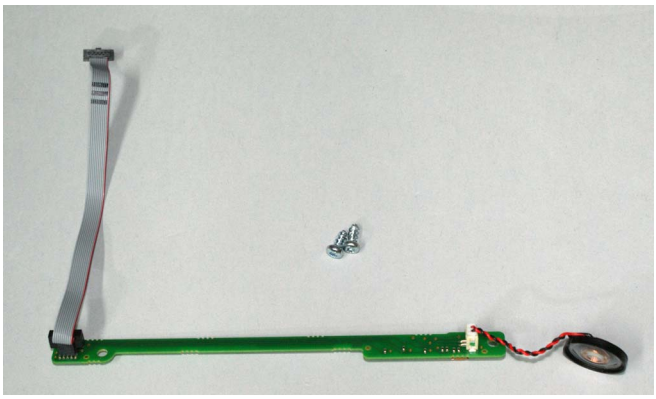


Keep the front unit assembly on the table, the touchscreen sensor facing down. Protect the touchscreen sensor from any scratches and dust.

1. Remove two screws (T10) that mount the user interface board to the front unit. Torque [0.6 Nm].



2. Detach the buzzer cable from the user interface board.
3. Lift the buzzer up.
   The front unit with the touchscreen sensor is a FRU. The user interface board with the buzzer is another FRU.



- FRU, User Interface Board& Buzzer, B450

- FRU, Front unit with touchscreen sensor, B450

Reassemble in reverse order.

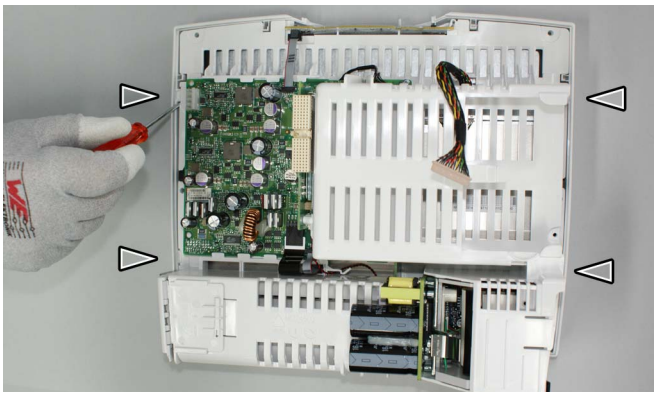
Note: Make sure to guide the buzzer cable through the guiding notch.

12.2.15 Replacing the alarm light board (FRU)

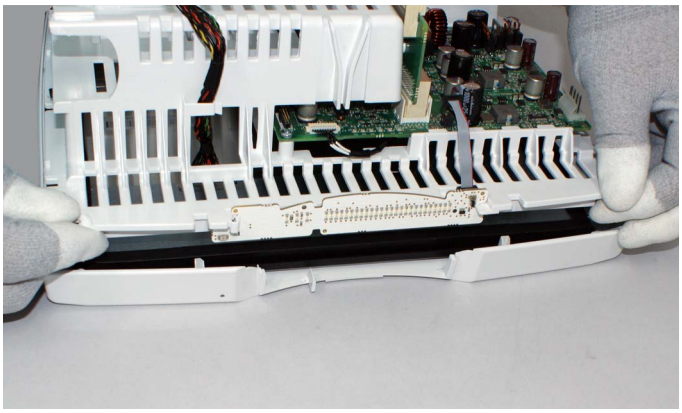
Disassemble first:

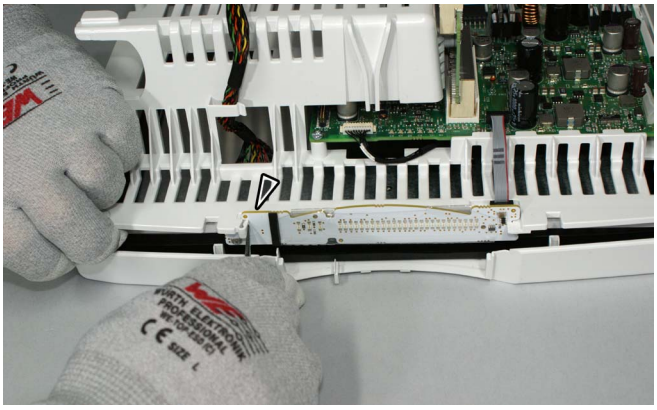
a. 12.2.6. Detaching the front unit and mid-frame assembly from the rear unit assembly

1. Detach the alarm light board cable from the DC/DC board.

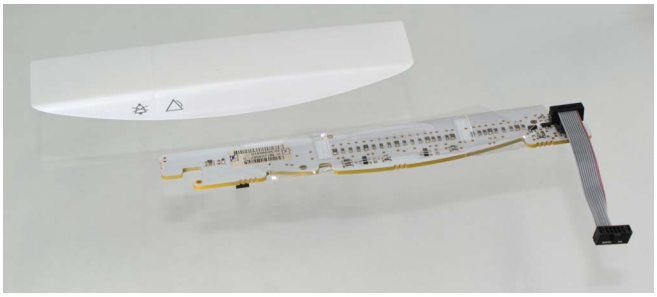


2. Release the four snaps - two on each side - that mount the front unit assembly to the mid-frame assembly to be able to detach the alarm light board and detach the alarm light board.





3. Release the snap that holds the alarm light board.



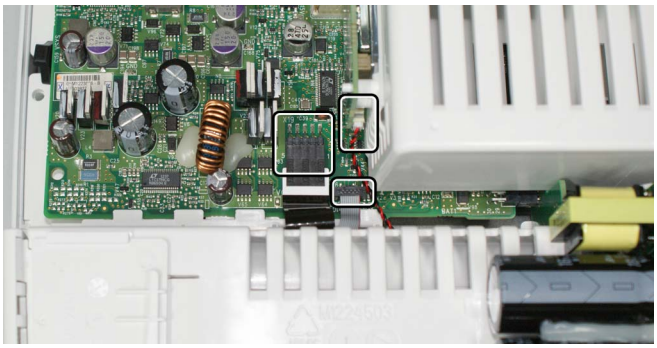
- FRU, Alarm light unit, B450.

Reassemble in reverse order.

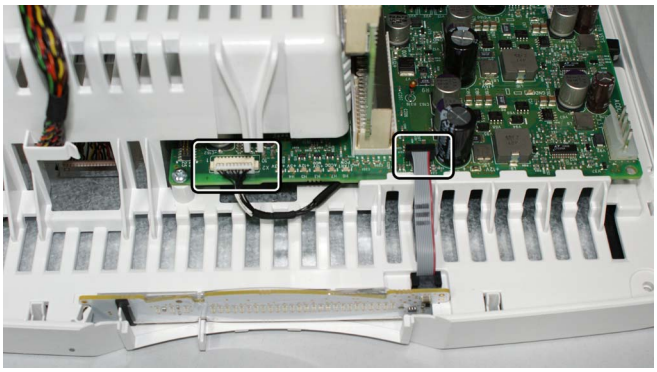
12.2.16 Detaching DC/DC board and E-Module board assembly

Disassemble first:

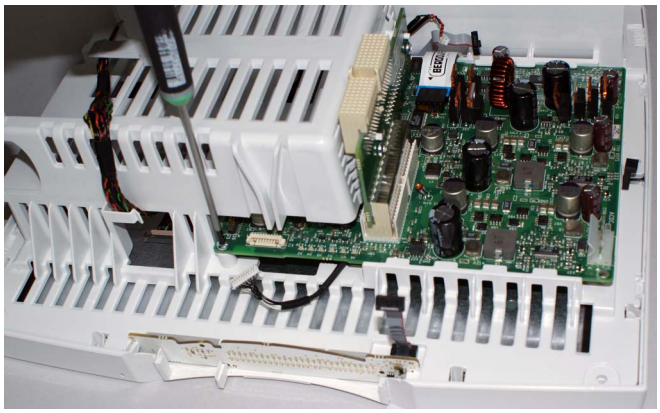
a. 12.2.6. Detaching the front unit and mid-frame assembly from the rear unit assembly



1. Detach the following cables:
   - the touchscreen cable and the user interface cable from the DC/DC board
   - the speaker cable from the E-module board

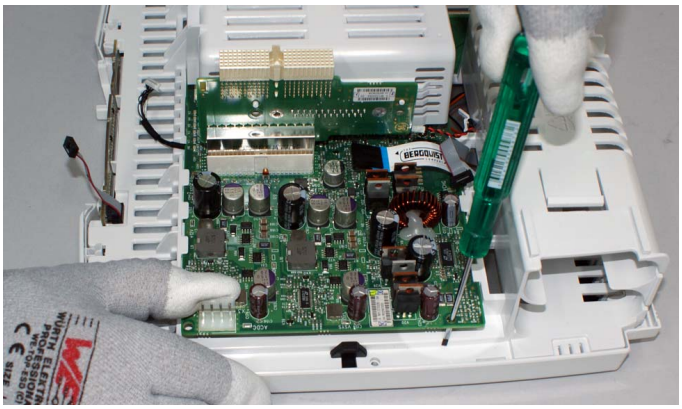


2. Detach the following cables from the DC/DC board:
   - Alarm light board cable
   - LCD backlight cable



3. Remove the screw (T10) that mounts the DC/DC board to the mid-frame assembly. Torque [0.6 Nm].

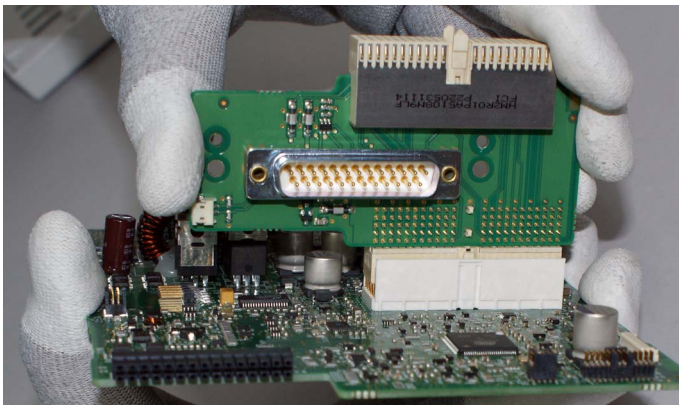
4. Remove the two screws (T10) that mount the E-module board to the mid-frame assembly. Torque [0.6 Nm].



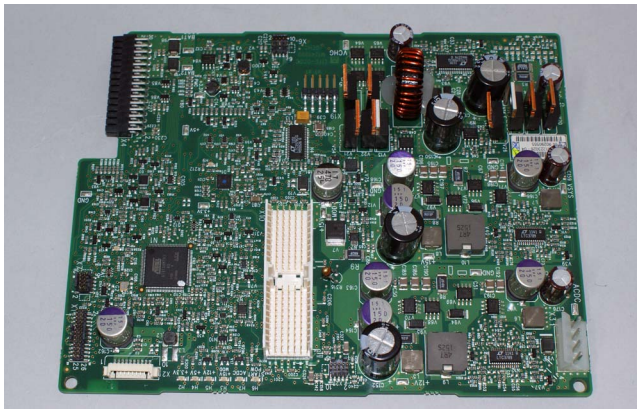
5. Use the flat blade screw driver to release the DC/DC board and the E-module board assembly from the mid-frame assembly.

6. Slide the DC/DC board and E-Module board assembly out from the mid-frame assembly.

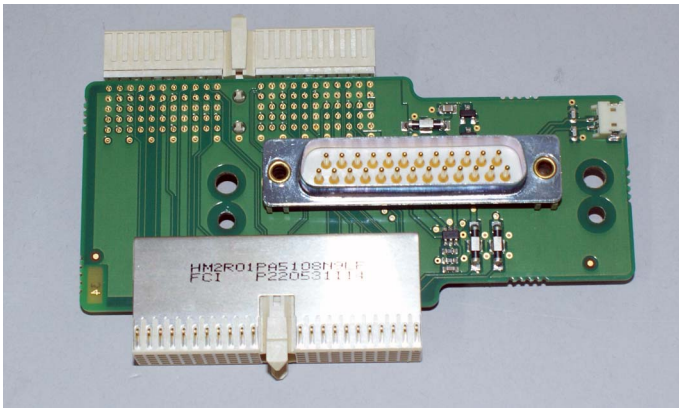
NOTE: When reassembling, make sure that the connector between the battery board and the DC/DC board is properly connected.



7. Detach the E-module board from the DC/DC board.



- FRU, DC/DC Board, B450.



- FRU, E-Module Board, B450

Reassemble in reverse order.

NOTE: After replacing the DC/DC Board, during the first start-up, the patient monitor will automatically check the PUIC software version in the replaced DC/DC board and update the software if necessary. Wait for 5 minutes to see, if the software update is initiated and do not interrupt the process.

12.2.17 Replacing the battery board (FRU)

Disassemble first:

a. 12.2.6. Detaching the front unit and mid-frame assembly from the rear unit assembly
b. 12.2.16. Detaching DC/DC board and E-Module board assembly

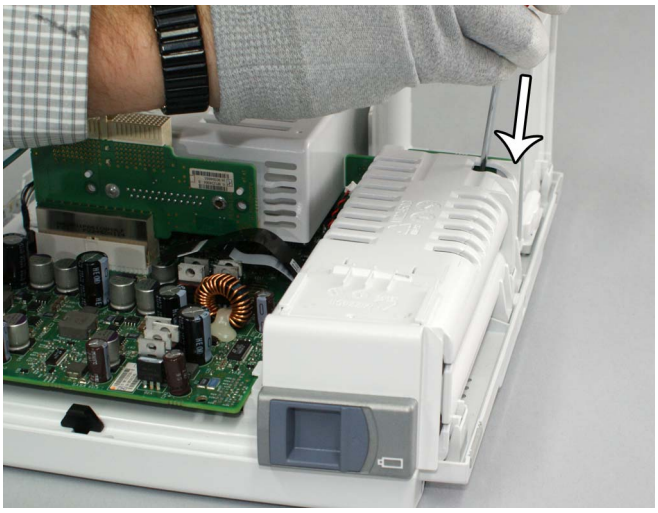
Steps 1. to 3. only for monitors with a recorder:

1. Press the two snaps on each side of the recorder with a flat blade screwdriver.

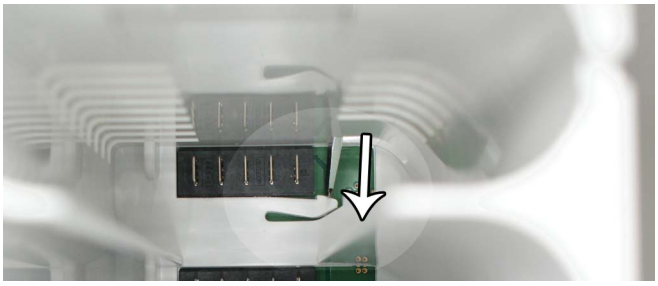
NOTE: If the monitor is not equipped with a recorder, there is a cover plate, which you do not have to remove.

2. Press the grounding plate to release the recorder unit from the mid-frame assembly.

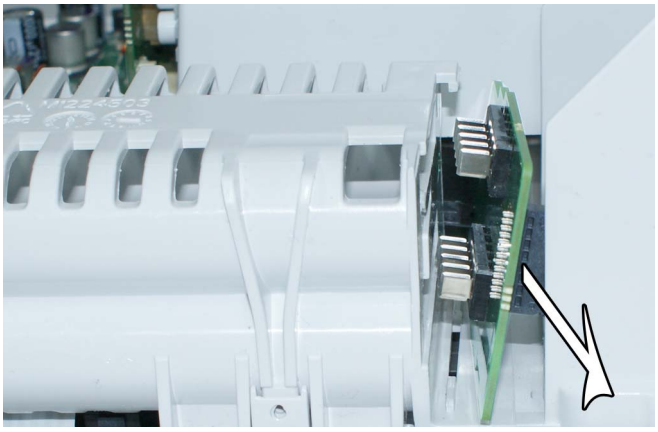
3. Pull the recorder out of the mid-frame assembly.



4. Use a flat blade screwdriver to press the snap that holds the battery board to the mid-frame assembly.



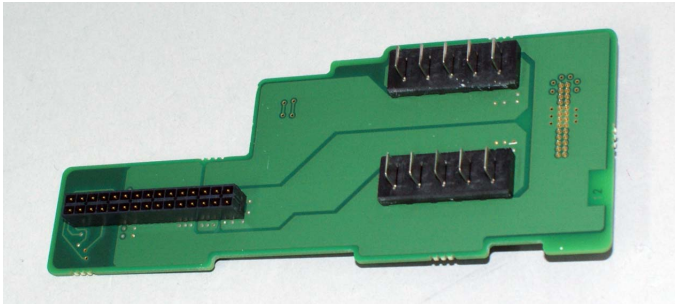
The tip of the screwdriver seen through the open battery slot.



5. Pull the battery board out from the mid-frame unit assembly.

Reassemble in reverse order:

- Ensure that the battery board is correctly aligned to its guide rails and DC/DC board - battery board connector is properly connected.



- FRU, Battery board, B450

For your notes:

13 Service parts

NOTE: Perform the specified checkout procedure steps described in chapter 10. Maintenance and checkout after you have replaced any service part.

13.1 Ordering parts

To order parts, contact GE Healthcare. Contact information is available at www.gehealthcare.com. Make sure you have all necessary information at hand.

13.2 List of FRUs

#	FRU/Item part number	FRU/Item description	FRU content
1	M1233483	FRU, Recorder Unit, B450	Includes the thermal printer and recorder interface board assembly.
2	M1233485	FRU, AC/DC Power Supply Unit, B450	Includes the complete AC/DC Power Supply Unit with AC inlet, fuses, heat sink and the cable to DC/DC board.
3	M1168221	FRU, Main Fuses (10 pcs), B450 & B650	FUSE, 4A, T, 250V, 5x20mm, high breaking capacity 1500A, IEC, UL/CSA, CCC, 2 pcs
4	M1233487	FRU, Module Rail Unit, B450	Includes a complete PDM/PSM module rail unit assembly with the 4 mounting screws.
5	M1233489	FRU, Battery Door Unit, B450	Includes a complete battery door assembly.
6	M1233490	FRU, LCD Display Unit, B450	Includes the LCD display with LED backlights, display cable & LED backlight cable and the gasket around the display.
7	M1233491	FRU, Front Unit w. Touchscreen Sensor, B450	Includes the complete plastic front bezel subassembly with the touchscreen sensor & cable.
8	M1233492	FRU, User Interface Board & Buzzer, B450	Includes user interface board, user interface cable, buzzer and the screws to mount the UI board.
9	M1233493	FRU, Speaker Unit, B450	Includes the main speaker with cable.
10	M1233494	FRU, Alarm Light Unit, B450	Includes the alarm light board, alarm light cable and plastic alarm light lens.
11	M1233495	FRU, DC/DC Board, B450	Includes the DC/DC board with the mounting screw.
12	M1233496	FRU, CPU Assembly, B450	Includes CPU carrier board, CPU Module, CPU battery, heat sink and all fastening parts Excludes the USB Disk on Module (uDOM) with monitor software.
13	2069650-001	FRU, CPU Battery (5 pcs), B450	CR2032, Coin battery, Li / MnO2, min capacity 225mA

#	FRU/Item part number	FRU/Item description	FRU content
14	M1233497	FRU, Battery Board, B450	Includes the battery board.
15	M1233498	FRU, E-Module Board, B450	Includes the E-Module board with the mounting screws.
16	M1233499	FRU, WLAN assembly, B450	Includes the complete WLAN assembly with WLAN radio card and 2 mounting screws, antenna cables and antenna boards.
17	M1233501	FRU, Plastics Kit, B450	Includes the following plastic parts: service cover, middle frame, power cable w. lock & spring, recorder cover and alarm lens.
18	M1233502	FRU, Hardware Kit, B450	Includes a complete set of fastening parts that are needed to re-assemble the patient monitor.
19	M1233503	FRU, Cable Kit, B450	Includes the user interface cable, alarm light cable, touchscreen cable and LCD backlight cable
20	2062895-001	Monitor Battery (1 pc), B450	Includes one monitor battery, type “FLEX-3S2P”.

APPENDIX A: Installation check form

CARESCAPE Monitor B450

Customer	Monitor	S/N
Service		S/N
Service engineer	Software	

Prior to testing verify all equipment is calibrated via "Cal" labeling and record Cal Due Dates

Measuring equipment / test gases used				
Equipment / tool / gas	Manufacturer	Model/Type/Part No	Serial Number/ID	Cal Due Date

PASS = Test passed **N.A. = Test not applicable** **FAIL = Test failed**

	PASS	FAIL
Visual inspection	☐	☐

Electrical safety tests				
The manufacturing week and year of the device:				
Is there less than 12 months since the device was manufactured?				
Yes: ☐	Yes: you do not have to perform the electrical safety tests. To continue the installation check, mark the electrical safety test completion N.A. and proceed to Functional check. If available, attach the original electrical safety test results to this check form.			
No: ☐	No: continue to perform the electrical safety tests.			
Power outlet is correctly wired.				☐ ☐
Power cord and plug are undamaged and all conductors are properly connected.				☐ ☐
Ground (earth) integrity		Observed result	Acceptance criteria	**PASS N.A. FAIL**
a.) Ground continuity test	without power cord		≤ 0.1 ohms	☐ ☐ ☐
	with power cord		≤ 0.2 ohms	☐ ☐ ☐
b.) Impedance of protective earth connection	without power cord		≤ 0.1 ohms	☐ ☐ ☐
	with power cord		≤ 0.2 ohms	☐ ☐ ☐

Earth leakage current test	Normal Condition (NC)		≤ 500 µA *EN /IEC* ≤ 300 µA *UL*	☐	☐	☐
	Single Fault Condition (SFC)		≤ 1 mA	☐	☐	☐
Enclosure leakage current (touch current) test	Normal Condition (NC)		≤ 100 µA	☐	☐	☐
	Single Fault Condition (SFC)		≤ 500 µA *EN /IEC* ≤ 300 µA *UL*	☐	☐	☐

Module type	**S/N**	**Observed result**		**Acceptance criteria**	**PASS**	**N.A.**	**FAIL**
		ECG	**SpO2/ InvP**				
Patient (source) leakage current tests, using a test body					☐	☐	☐
Normal Condition (NC)	Polarity: NORMAL			≤ 10 µA	☐	☐	☐
Single Fault Condition (SFC)	Ground closed (normal)			≤ 50 µA	☐	☐	☐
	Ground open (normal)			≤ 50 µA	☐	☐	☐
	Ground closed (reverse)			≤ 50 µA	☐	☐	☐
	Ground open (reverse)			≤ 50 µA	☐	☐	☐
Normal Condition (NC)	Polarity: Reserved			≤ 10 µA	☐	☐	☐
Patient (sink) leakage current tests	Polarity: NORMAL			≤ 50 µA	☐	☐	☐
	Polarity: Reserved			≤ 50 µA	☐	☐	☐

Module type	**S/N**	**Observed result**	**Acceptance criteria**	**PASS**	**N.A.**	**FAIL**
Patient (source) leakage current tests, using a test body				☐	☐	☐
Normal Condition (NC)	Polarity: NORMAL		≤ 10 µA	☐	☐	☐
Single Fault Condition (SFC)	Ground closed (normal)		≤ 50 µA	☐	☐	☐
	Ground open (normal)		≤ 50 µA	☐	☐	☐
	Ground closed (reverse)		≤ 50 µA	☐	☐	☐
	Ground open (reverse)		≤ 50 µA	☐	☐	☐
Normal Condition (NC)	Polarity: Reserved		≤ 10 µA	☐	☐	☐
Patient (sink) leakage current tests	Polarity: NORMAL		≤ 50 µA	☐	☐	☐
	Polarity: Reserved		≤ 50 µA	☐	☐	☐

Electrical Safety Test completion	☐	☐	☐

Functional check							
	PASS	N.A.	FAIL		PASS	N.A.	FAIL
Start-up	☐		☐	Display	☐	☐	☐
Device Information	☐		☐	Configuration Information	☐		☐
Keypad and remote	☐	☐	☐	Mouse	☐	☐	☐
Alphanumeric keyboard	☐	☐	☐	Barcode reader	☐	☐	☐
MC Network and S/5 Network	☐	☐	☐	Wireless LAN	☐	☐	☐
IX printers	☐	☐	☐	iPanel connection	☐	☐	☐
Insite with EXC	☐	☐	☐	Test completion	☐	☐	☐

Notes

Used service parts			

Signature	Date

APPENDIX B: Maintenance check form

CARESCAPE Monitor B450

Customer	Monitor	S/N
Service		S/N
Service engineer	Software	
Planned maintenance ☐ Corrective maintenance ☐	Module type	S/N

Prior to testing verify all equipment is calibrated via "Cal" labeling and record Cal Due Dates

Measuring equipment / test gases used:				
Equipment / tool / gas:	Manufacturer:	Model/Type/Part No:	Serial Number/ID:	Cal Due Date:

PASS = Test passed **N.A. = Test not applicable** **FAIL = Test failed**

	PASS	FAIL
Visual inspection	☐	☐

Electrical safety tests						
Power outlet is correctly wired.				☐		☐
Power cord and plug are undamaged and all conductors are properly connected.				☐		☐
Ground (earth) integrity		Observed result	Acceptance criteria	PASS	N.A.	FAIL
a.) Ground continuity test	without power cord		≤ 0.1 ohms	☐	☐	☐
	with power cord		≤ 0.2 ohms	☐	☐	☐
b.) Impedance of protective earth connection	without power cord		≤ 0.1 ohms	☐	☐	☐
	with power cord		≤ 0.2 ohms	☐	☐	☐
Earth leakage current test	Normal Condition (NC)		≤ 500 µA *EN /IEC* ≤ 300 µA *UL*	☐	☐	☐
	Single Fault Condition (SFC)		≤ 1 mA	☐	☐	☐
Enclosure leakage current (touch current) test	Normal Condition (NC)		≤ 100 µA	☐	☐	☐
	Single Fault Condition (SFC)		≤ 500 µA *EN /IEC* ≤ 300 µA *UL*	☐	☐	☐
Electrical Safety Test completion				☐	☐	☐

Functional check							
	PASS	**N.A.**	**FAIL**		**PASS**	**N.A.**	**FAIL**
Start-up	☐	☐	☐	Display	☐	☐	☐
PSM / PDM identification	☐	☐	☐	E-module identification	☐	☐	☐
Keypad and remote	☐	☐	☐	Mouse	☐	☐	☐
Alphanumeric keyboard	☐	☐	☐	Barcode reader	☐	☐	☐
MC Network and S/5 Network	☐	☐	☐	Wireless LAN	☐	☐	☐
IX printers	☐	☐	☐	iPanel connection	☐	☐	☐
Insite with EXC	☐	☐	☐	Recorder	☐	☐	☐
Synchronization connector test	☐	☐	☐	Test completion	☐	☐	☐

Notes

Used service parts			

Signature	Date

APPENDIX C: Verification procedure for wireless MC Network infrastructure

Purpose and scope

The purpose of this verification procedure is to test the operation of the wireless network infrastructure with a wireless CARESCAPE Monitor B450, the transport monitor.

To verify the operation, you move the transport monitor throughout the predetermined wireless coverage area and observe that a constant ECG waveform from a stationary hardwired patient monitor is displayed in the bed-to-bed view of the wireless CARESCAPE Monitor B450 during the transport.

Due to the dynamic nature of a wireless environment this test provides only a snapshot of the wireless network at the time of performing the test. This is not a comprehensive test that covers all possible use situations, network traffic situations, radio frequency interferences or takes into account possible other changes in the wireless environment.

Test equipment and documentation needed

Ensure that you have the following equipment and documentation available.

CIC Pro:

- CIC Pro Clinical Information Center with full disclosure license.

NOTE: CIC with full disclosure license is optional. It is needed for documentation and reporting purposes only. It enables you to view afterwards potential network connectivity issues between the transport monitor and the wireless MC Network, and to print reports about waveform loss situations.

Hardwired CARESCAPE modular monitor, the stationary monitor:

- A CARESCAPE modular monitor with wired MC Network connection.
- A PDM or PSM module.
- A compatible 5-lead ECG trunk cable and 5-leadwire set.
- A patient simulator.

NOTE: You can alternatively use compatible Dash, Solar or S/5 monitor as a stationary monitor. Check CARESCAPE Modular Monitors Supplemental Information Manual for software compatibility.

Wireless CARESCAPE Monitor B450, the transport monitor:

- CARESCAPE Monitor B450 with wireless MC Network connection.
- A PDM or PSM module. *)
- A compatible 5-lead ECG trunk cable and 5-leadwire set. *)
- A battery operated patient simulator. *)
- Service PC (laptop) with a crossover Ethernet cable.
- A plastic roll cart for the patient monitor, service PC and the simulator. To avoid RF impairment, do not use metal roll carts.

NOTE: *) The PDM/PSM module, ECG cables and patient simulator for the wireless CARESCAPE Monitor B450 are needed only, if a CIC with full disclosure license is available in the MC Network.

Documentation about the Wireless LAN infrastructure:

- GE WLAN pre-quote questionnaire with all applicable attachments.
- Wireless LAN design documentation, including site survey results.

Test plan

Each wireless installation is unique. As it is often impractical and uneconomical to verify the whole wireless coverage area and all the installed access points, prepare a site specific test plan that covers the areas that are most likely to encounter issues with the wireless communication.

Utilize the information provided in the pre-quote questionnaire, existing design documentation and site survey results, and discuss with the hospital IT specialists and clinical staff to identify the areas that are riskiest for poor wireless communication, and prepare a test plan accordingly.

Take into account the following aspects when preparing a test plan.

- Identify areas with known or obvious low signal strength.
- Identify areas with known sources of radio frequency interference, causing high noise floor and/or poor signal-to-noise ratio.
- Identify the special characteristics in the building layout (floors, wings patient rooms) and construction material used.
- Identify the time and areas of congestion, with high number of wireless clients and a lot of network traffic.
- Identify intended clinical workflow paths, including bedside locations and transport routes.

Prepare the test plan by documenting the intended walking path and test points to the floor plan, preferably to copy of a site survey document that shows the wireless coverage area, the location of wireless access points, signal strengths and sources of known radio frequency interferences.

NOTE: In the sample floor plan below, EG1- EG20 represent possible test points. Take into account in your plan that some rooms and areas may not be accessible at the time of performing the survey.

Test setup

The patient monitors and the CIC Pro shall be installed, configured and tested to operate in the same MC Network.

CIC Pro:

- Configure the CIC to capture full disclosure data from the wireless CARESCAPE Monitor B450. Refer to CIC Pro Clinical Information Center Service Manual and CIC Pro Clinical Information Center Operator's Manual for detailed instructions.

Hardwired CARESCAPE modular monitor, the stationary monitor

Set up the connections:

1. Connect a PDM or PSM module to the patient monitor.
2. Connect the ECG cables to the module and to the patient simulator.
3. Turn on the patient monitor and the patient simulator.

Configure the patient simulator:

4. Configure the patient simulator to output ECG waveform: normal sinus rhythm, hearth rate 80 bpm, amplitude 1mV. Refer to the simulator documentation for details on how to use and configure the simulator.

Configure the patient monitor:

5. Configure the ECG1, ECG2 and ECG3 waveform fields to the monitor screen with adequate priority.
6. Select the ***Setup*** tab in the ***ECG*** menu and configure: ***ECG1 lead: II, ECG2 lead: V1, ECG3 lead: aVL***.
7. Start a patient case / admit a patient in ***Data*** & ***Pages > Admit/Discharge*** menu.

Wireless CARESCAPE Monitor B450, the transport monitor

NOTE: The PDM/PSM module, ECG cables and patient simulator for the wireless CARESCAPE Monitor B450 are needed only, if a CIC with full disclosure license is available in the MC Network. Skip steps 2, 3, 4, 7 and 8, if CIC with full disclosure license is not available.

NOTE: Ensure that the patient monitor battery, the service PC battery and the patient simulator battery are fully charged.

Set up the connections:

1. Set up the CARESCAPE Monitor B450 and the service PC on a roll cart.
2. Connect a PDM or PSM module to the patient monitor.
3. Connect the ECG cables to the module and to the patient simulator.
4. Connect the service PC to the patient monitor IX port using the Ethernet crossover cable.
5. Turn on the patient monitor, the service PC and the patient simulator.

Configure the patient simulator:

6. Configure the patient simulator to output ECG waveform: normal sinus rhythm, hearth rate 80 bpm, amplitude 1mV. Refer to the simulator documentation for details on how to use and configure the simulator.

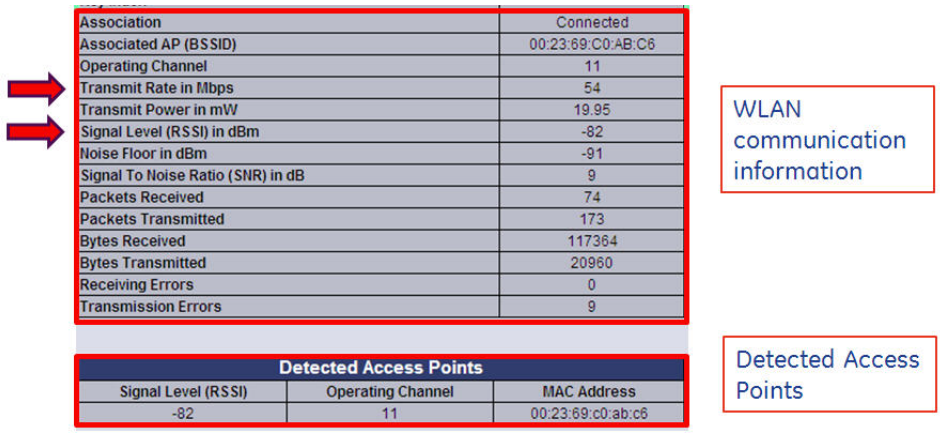
Configure the patient monitor:

7. Configure the ECG1, ECG2 and ECG3 waveform fields to the monitor screen with adequate priority.
8. Select the ***Setup*** tab in the ECG menu and configure: ***ECG1 lead: II, ECG2 lead: V1, ECG3 lead: aVL.***
9. Start a patient case / admit a patient in ***Data & Pages > Admit/Discharge*** menu.
10. Select ***Data & Pages > Other Patients***. Select the unit and bed name of the stationary monitor and then select ***View***.

Configure the service PC:

11. Login to Webmin and select ***Diagnostics > WLAN***.

NOTE: The WLAN information shown in Webmin Diagnostics page is static. Press **F5** to refresh the web browser and to see up-to-date WLAN diagnostics data.



Test execution

Execute the test procedure according to the test plan. Contact the nursing staff to ensure access to the needed areas before starting the test.

1. Move the roll cart to the starting point of the planned test route.
2. Stop at each test point and perform the following tasks:

a. On the transport monitor: Verify that ECG waveforms from the remote, stationary patient monitor display in the bed-to-bed view without any losses.

b. On the service PC: Refresh Webmin view by selecting **F5** and:

- Identify the Access Point the patient monitor is connected to.
- Verify that the ***Signal level (RSSI)*** in dBm is greater than or equal to -60 dBm.
- Verify that the ***Transmit Rate in Mbps*** is greater than or equal to 5.5 Mbps.

c. Mark the network time, RSSI and Transmit Rate to the test form.

d. If there is a waveform loss situation or the RSSI or the Transmit Rate is lower than specified:

- Observe the length of the waveform loss and, if possible, potential cause of it, for example roaming or out of range situations.

- Take a snapshot of the refreshed WLAN Diagnostics screen, for example, by printing it to a file.

3. Move the roll cart to the following test point along the walking path and repeat the step 2 at each test point until you have completed the test plan. While moving the roll cart from one test point to another, at all times, verify that there are no losses in the ECG waveforms.
   NOTE: A momentary, up to 5 seconds waveform loss is normal during roaming. If longer, or repeating waveform losses occur between test points, make this an extra test point and report it the same way as observations in step 2.

Summary and Reporting

Include the following documents to the test results:

1. Print the full disclosure reports from the CIC about the observed waveform loss situations.
2. Print the snapshots of the WLAN diagnostics screens that you saved into the service PC.
3. Mark to the printouts the id of the test point.

Review and evaluate the test results together with GE personnel and the hospital IT specialists. Summarize, if additional testing is needed and/or if the WLAN infrastructure needs to be changed.

Test Form

Observations

Test point #	Time (hh:mm:ss)	RSSI (dBm)	Transmit rate (Mbps)	Observations

Test summary and recommended actions

Date & time of testing **Signature**

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